ADVERTISING PAGES REMOVED

THE FOUNDRY

Editorial Staff

FRANK G. STEINEBACH
Editor

PAT DWYER
Engineering Editor

EDWIN BREMER
Metallurgical Editor

DON S. CADOT
Art Editor

New York . . . B. K. PRICE, L. E. BROWNE, I. H. SUCH

Chicago . . . . J. F. POWELL
Detroit . . . . A. H. ALLEN
Pittsburgh . . . . R. L. HARTFORD
Washington . . . L. M. LAMM
London . . . VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON
ALBERT E. GROVER
JOHN HOWE HALL
N. K. B. PATCH
HARRY A. SCHWARTZ

Business Staff

J. M. LATHROP
Advertising Manager

R. C. WELLMAN
Circulation Manager

New York . . . . . J. F. AHRENS
Chicago . . . . . L. C. PELOTT, G. A. POPE

Pittsburgh . . . . . S. H. JASPER
Cleveland . . . . A. L. KLINGEMAN

MAIN OFFICE

Penton Building, Cleveland, Ohio

BRANCH OFFICES

New York . 110 East 42nd Street
Chicago . 520 North Michigan Avenue
Pittsburgh . . Koppers Building
Washington . National Press Building
Detroit . . . 6560 Cass Avenue
London . . . . . Caxton House, Westminster, S.W. 1.

THE FOUNDRY is published monthly by The Penton Publishing Co., Penton Building, 1213 West Third street, Cleveland, O. JOHN A. PENTON, Chairman, Board of Directors; EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and FRANK G. STEINEBACH, Secretary.

Subscriptions: United States, Canada and Mexico, $2.00 a year, Great Britain and other Foreign Countries, $4.00 a year; single copies 25 cents. Copies published three months or more previous to date of current issue, 50 cents.

Member: Audit Bureau of Circulations, Associated Business Papers, National Publisher's Association. Copyright 1940 by The Penton Publishing Co.

Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879

CONTENTS

VOLUME 68 **AUGUST, 1940** *NUMBER 8*

	PAGE
Editorial	23
Cleanliness Features Shop Melting Brass for Plumbing Trade *By Pat Dwyer*	24
Utilize Coke From Cupola Drop *By Robert Læicht*	27
Foundry Practice Affects Yield *By J. B. Atkinson*	28
Glass Molds Present Many Problems *By Robert M. Scafe*	30
A.S.T.M. Considers Standards and Military Preparedness	32
Patterns and Pattern Design for Nonferrous Foundries *By N. K. B. Patch*	33
Investigates Problem of Cooling Sand *By F. H. Amos*	34
Questions and Answers	36
Men of Industry	42
Foundry Developments at Short Range	48
The Adventures of Bill *By Pat Dwyer*	50
Among Detroit Foundries *By A. H. Allen*	55
Activities of Foundry Groups	60
Readers' Comment	76
Abstracts from World Literature	79
New Equipment and Supplies	80
Obituary	88
Foundry Activities	91
Where-to-Buy Directory	111
Reviews of Manufacturers' Literature	123
Index to Advertisers	140

ADVERTISING PAGES REMOVED

NEW YORK PHILADELPHIA BOSTON WESTFIELD

The H. B. Smith Company, Incorporated

Makers of
CAST IRON BOILERS AND RADIATORS

General Office and Plant
WESTFIELD, MASSACHUSETTS June 25,1940.

The Werner G.Smith Co.
Division of Archer-Daniels-Midland Co.
2191 East 110th St.
Cleveland,Ohio.

Gentlemen:

We are enclosing some pictures of our #25 Smith Mills Boiler. This boiler is being made in a wide range of sizes and models for both steam and hot water, and types are available for both hand-fired and automatic-fired fuels.

This boiler has been designed to heat small commercial buildings such as monitor stores, garages and small apartment blocks, and represents the most modern unit available for this type of work, as it not only furnishes heat but also provides domestic hot water either to a storage tank or through a tankless sytem.

The leg section shown weighs 290 lbs. and the core about 162 lbs. Of course, we are using Werner G.Smith core oil for these sections, because of the excellent results we have had with your oil over a 22 year period.

The cut of the core storage shows about 300 cores and is one of three such storages. These cores are at times left in storage several weeks and therefore it is of utmost importance that a moisture proof binder be used.

May we take this opportunity to express our appreciation for the service your Company has rendered us during the many years we have used your product?

Very truly yours,

The H.B.Smith Co.Inc.

Gw Bonaback
W.F.Bonaback, Purchasing Agent

Enc.

They know, and all New England knows, that good core oil pays real dividends to users.

LINOIL. TRUE FRIEND OF BUSY FOUNDRYMEN

THE WERNER G.

(DIVISION OF ARCHER

2191 WEST 110th ST.

Warehouse

Boston, Mass.
Hartford, Conn.
Bayway, N. J.
Buffalo, N. Y.
Birmingham, Ala.
Dayton, Ohio
Indianapolis, Ind.
Chicago, Ill.
Moline, Ill.

Canada—WERNER G. SMITH, Ltd.

Factory and Office,

THE FOUNDRY

EDITORIAL

Army and Navy Need Data on Advantages of Castings

GREATER speed in prosecuting the armament program seems assured since the administration at last has agreed to remove some of the many obstacles which have confronted industrial concerns when considering participation in defense work. The recent decision, influenced greatly by the Knudsen-Stettinius group, which permits plant and equipment amortization on a 5-year basis, applies the anticipated excess profits tax to all industries, and drops the 7 and 8 per cent profit limitations on naval construction and army and navy aircraft in favor of the excess profits tax, should remove several sources of uncertainty for manufacturing companies finding it necessary to expand facilities for national defense work. A good start has been made, but if this country is to be prepared to meet any emergency that may arise, further sacrifices of so called social gains are mandatory, especially the relaxing of provisions of the wages and hours act.

While many foundries are relatively busy on work related in some way to the defense program, demand for castings from that source has not been as great as might have been expected. Much of this is due to a general lag in government procurement and several more months probably will be required to develop a marked increase in orders for such castings. Considerable blame for this lack of volume demand for castings rests with the foundry industry which, for many years has done little to acquaint the army and navy with the advantages of using castings for many military purposes. Now that pressure is on the procurement departments of the army and navy, engineers of both service branches are not inclined to experiment with various materials, but generally follow practice in recent use. Undoubtedly, materials fabricated by competing methods now are used at many points where the superior quality castings of recent years would do a better job. While progress is being made in correcting this situation, greatest benefits can be secured only through co-operative effort.

Washington has indicated on numerous occasions that practically all contact between various government agencies and individual industries will be made through the trade association of the particular group. The Steel Founders' Society of America and the Malleable Founders' society each represent the vast majority of companies in the steel and malleable foundry industries respectively and are well equipped to render an important service to their members. The Gray Iron Founders' society has an excellent skeleton organization supported by a relatively small membership of farsighted gray iron foundrymen, but renders a valuable service to the entire gray iron industry. That industry needs the society and undoubtedly will need it far more in the days immediately ahead. As a matter of self protection, all gray iron foundries should provide prompt support to the society through membership. At the same time to meet the many problems that lie ahead, progressive foundrymen in the nonferrous industry should undertake at once the formation of a trade association.

Various government agencies are advising manufacturers against directing correspondence regarding the defense program to Washington, or in visiting the capitol to place their facilities at the disposal of the National Defense commission. The procurement system is decentralized and details of the armament program are being handled by procurement officers located in various districts throughout the country. Seventy-three field offices of the army and navy departments located in 22 cities are provided with complete information on present purchasing needs and on other factors of industrial mobilization pertaining to the specific areas in which industrial plants are located.

Frank G. Steinebach
Editor

CLEANLINESS FEATURES SHOP Melting Brass FOR PLUMBING TRADE

By PAT DWYER

GOOD housekeeping methods and modern equipment are exemplified to a remarkable extent in a nonferrous foundry recently placed in operation by the Victoria Metal Co. Inc., on the western outskirts of Erie, Pa. The walls of concrete blocks faced with brick on the outside to conform with the remainder of the factory building carry extensive windows from a line about 4 feet above the floor to the eaves. A second continuous row of windows in the monitor roof provide additional light over the entire floor area. An adjustable swinging section in the center of each window and above each molder's station admits fresh air to meet the requirements of the individual operator. Since all the castings produced in this foundry are comparatively light and thin, the amount of steam generated during the pouring and shaking out periods rapidly is dissipated in the general atmosphere and is not a factor of any importance.

The melting department, to be described in more detail later, is separated from the main section of the foundry and is ventilated artificially by a suction fan. As a result, none of the smoke or other products of combustion enter the foundry. Steel frame work resting on pillars inside the walls support the roof. A light monorail directly above each floor and extending from a main gangway to the wall at the opposite side of the building, is suspended by long ⅝-inch bolts equipped with turn buckles

and attached 3 feet apart, in some instances to the main beams and in other places to the purlins. This feature provides a great deal more than any required safety factor for a load that never exceeds approximately 300 pounds, a chain hoist, crucible and tongs.

The new foundry is part of a general plant expansion which includes cleaning, machining, plating and shipping departments, all under the one roof and arranged in logical sequence to permit continuous flow of materials through the various processes, to finally arrive at the shipping and stock room at the front end of the building alongside the office. Space formerly occupied by the foundry has been converted into an extension to the cleaning and plating department, equipped with grinding and polishing fixtures and a large exhaust system for removal of dust of various kinds from the atmosphere. The new foundry 50 x 100 feet, with level concrete floor and wide gangways is located at the east end of the long factory building. The original end wall of the building now serves as a partition.

Formerly General Jobbing Foundry

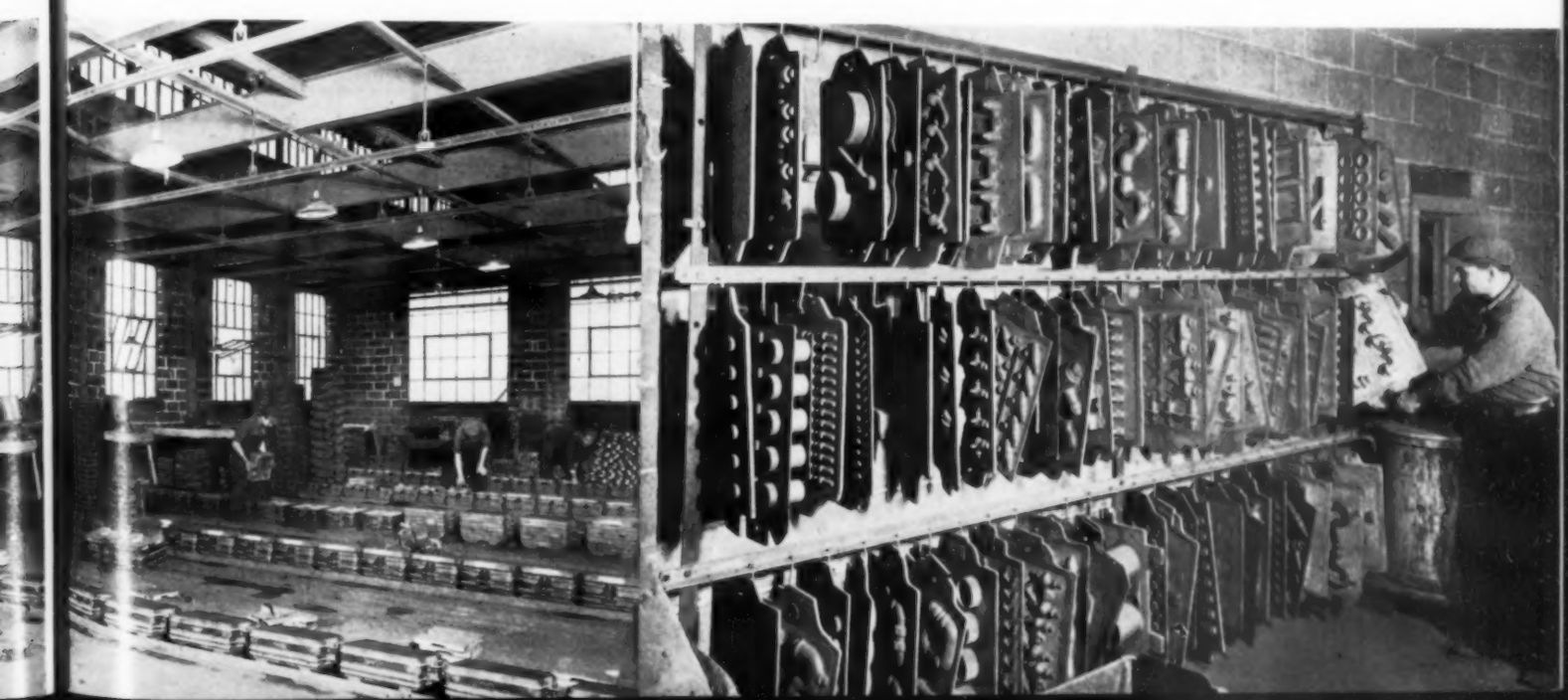
Although now engaged exclusively in the production of plumbers' red and yellow brass castings, the business originally was established in 1910 as a general jobbing brass foundry. Transition to the specialty line extended over a period of several years and necessitated several changes in plant layout and operation. An entirely new plant, laid out and equipped in a modern manner, was erected and placed in operation in 1936. Changes major and minor were introduced occasionally to conform with modern technical advance or fluctuations in business conditions. The new foundry provides ample room for all present requirements and for gradually increased production over a considerable period in the future.

Dried in Gas Fired Ovens

One corner of the core room, separated from the main foundry by a brick partition wall is shown in Fig. 6. The concrete floor, smooth and level facilitates movement of loads of cores on double deck buggies riding on small rubber tire wheels. Cores are made according to the universal practice of shops engaged on plumber's castings. Sand is packed in two half coreboxes. One half is inverted over the other—the term is booking—then removed and replaced by a dryer shell. The assembly then is turned over and the second half of the corebox is removed leaving the complete core resting in the shell. The cores are dried in two gas fired rolling drawer type ovens shown at the left of the illustration and made by the Foundry Equipment Co., Cleveland.

Miscellaneous character of the castings is shown in Figs. 2 and 4, the first a stack of castings ready to go into the cleaning room and the second one of the racks in the pattern storage department. Patterns are mounted on aluminum match plates of uniform dimensions to fit the steel flasks 12 x 18 inches. Where a deeper flask is required an upset is added to the cope or drag or in some instances to both. By using a uniform size flask on all floors, the total number of flasks is reduced to a minimum. The number also is held to a minimum by the practice common in all nonferrous foundries of pouring a certain number of molds on each floor successively throughout the day. With six furnaces running four or five heats per day each floor is poured before the number of molds exceed the

Fig. 1 (Upper Left)—Crucible is tilted with the tongs. Fig. 2 (Left Below)—Castings shaken out and stacked for removal to the cleaning room. Fig. 3 (Center)—Molding stations are located close to the windows. Fig. 4 (Right Below)—Aluminum pattern plates are suspended by hooks in an angle iron frame



space allotted on each floor. Castings are shaken out almost immediately after the metal is poured and in that manner the comparatively small amount of sand does not become unduly heated and readily may be reconditioned and shoveled back into the pile near the molding machine. A small amount of new sand added to the heap occasionally compensates for the sand carried away on the castings and also maintains the bond, permeability and other physical properties of the sand in the heap. Molders are experienced operators and are quite competent to prepare the sand with minor variations in the bond and moisture content to suit the various classes of castings. For example the sand for thin sleeves and bushings with green sand cores and cast on end carries 1 or 2 per cent less moisture than certain other castings poured flat.

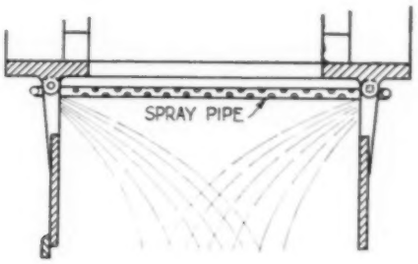
Molding machine stations are arranged in a line against the east wall as shown in Fig. 3 where the molds are made on a battery of seven jolt and squeeze machines, three supplied by the Osborn Mfg. Co., Cleveland, and four by SPO, Inc., Cleveland. A short steel partition extending from the wall keeps the sand piles separated between each pair of molders and also maintains the sand in orderly condition. A bench on top of each partition holds cores, tools and accessories and also serves as a resting place for cope or drag which may require some minor adjustment with tools, or a blast from an air jet to clean it before it is placed on the floor.

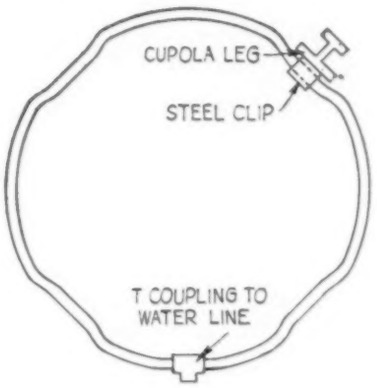
Fig. 5—Battery of gas fired melting furnaces located in a long pit with the covers flush with the floor and served by an overhead monorail

Molds for certain castings, sleeves, bushings, nipples and others of a somewhat similar shape, are placed flat on the floor. Majority of the molds are set up on a slight incline. One edge rests on the floor. The opposite edge, where the sprue is located, rests on a length of light steel rail. Practically all patterns are laid out on the plate in a manner that will permit the metal to be poured through a sprue at or near one end of the flask. With this arrangement the lip of the crucible can be brought close to the sprue opening to prevent dribbling and splashing of the metal. A handful of sand dabbed into place after the mold is placed on the floor, and shown at the lower left in Fig. 3, prevents any metal spilled accidentally from fouling the guide pins on the flask. Nothing remarkable about this shop kink of course but it is one of the little finishing touches that illustrate the general program of neatness and tidiness, one of the small gestures that proclaim whether a man is a professional or an amateur.

As a matter of fact the amount of metal that is splashed, spilled, or run over from the sprues is negligible. Since the crucibles are removed from the furnaces one at a time and in orderly sequence, one experienced operator can pour every one. Obviously a man who specializes in any form of activity and who practices constantly can do a better job than one with less experience or practice. This method also presents advantage in that the molders are not disturbed in their regular routine of preparing the sand, making the molds and placing them on the floor.

Interesting variation from the usual method of handling the crucible in a shank manipulated by two men is shown in Fig. 1. In this instance the pot is grasped firmly in a special pair of tongs provided with two claws on each member. After the crucible is lifted from the furnace it is taken to the floor at one end of the furnace pit. Here it is skimmed, any necessary alloys added, and then the pouring tongs are adjusted nicely to provide maximum support. A steel link embraces both handles of the tongs and holds them in intimate contact with the crucible. The tongs also are (*Please turn to page* 98)





Sectional views showing position of spray pipe, method of attaching to cupola legs and T-coupling to water line

Utilize Coke

FROM CUPOLA DROP

AFTER considerable comment and discussion by officials and employes on the advisability of using coke from the cupola drop, the following list of objections and suggested answers to the criticisms was drawn up for further consideration: 1. Coke has lost its life.—But we still use it in stoves and salamanders. 2. Hard to ignite.—Evidently it has some life. 3. Full of ash.—The ash can be slagged off. 4. Slag attached to the surface.—In one well known melting process the coke is deliberately coated to lower carbon pickup. Maybe this coke should be used only for high steel mixtures! 5. Has lots of sulphur.—Nonsense! Sulphur on surface is absorbed by iron, or oxidized, blown or dissolved. Anyway, who cares? Raise the manganese to where it should be, charge low sulphur iron, or use a desulphurizing agent. 6. It is expensive to handle.—Then why pick it up for other forms of heat. It is more valuable as cupola coke than stove coke. 7. Has lost its strength.Where is the proof? 8. Too small, will plug the draft.—Get a riddle. Who ever heard of throwing away the fines in new coke. Use them inside big cores if for nothing else.

Coke salesmen claimed that no real foundryman ever used coke from the cupola drop. Can you visualize any of the 500-ton-a-day or over foundrymen hauling carloads of foundry coke to the dump while they spend their hours running yard sweepings over a magnetic separator to recover a few pounds of iron shaving. Discussion with several foundrymen indicated that no good foundry risks its reputation in that manner. Where do all the droppings go?

In our case certain circumstances forced us to try to utilize the coke from under the cupola. We recovered approximately 500 pounds per heat for 100 heats in the summer and then found we had the equivalent of one car of coke, a bunch of accounts receivable and no money for buying new coke. The answer is obvious. We had to use the old coke and it did work.

New coke was used on the bed with the recovered coke between the charges in the proportion of 1 pound coke to 6 pounds iron in the first four charge, 1 to 8 in the next four charges and 1 to 9 for the remainder of the heat. Later, after we had accumulated another supply, we used it in the usual proportion of (*Please turn to page* 105)

Save on Old Coke

Extra time sorting over coke at 25 cents per heat for 100 heats	$25.00
Hauling to charging floor, 22 tons at 14 cents per ton	3.08
Water spray, 8000 gallons	1.60
Putting up spray	8.60
	$38.28
Coke salvaged, 22 tons at $13.00 ton average	286.00
Net saving	247.72

Enough to buy the use of $6,129.00 for one year.

By

By ROBERT LEICHT
Manager
Winona Machine & Foundry Co.
Winona, Minn.

Foundry Practice Affects

YIELD in a steel foundry means the difference between the metal charged into the furnace and the metal shipped as castings to the customers. Yield represents the value in dollars and cents of castings that pass over the scales and which are invoiced to the customer for payment. It is governed by many influences direct and indirect, controlled and overcome mainly through study, planning, research and past experience of any organization.

Yield is influenced by all departments. From the time the inquiry is received until the job is shipped to the customer, each departmental operation exercises a direct effect upon the yield—good or otherwise. The word yield may not mean as much to the average individual as to one occupied in checking results or to the management of the company, but the word has more bearing on operating costs, sales prices to customers and profits or losses to a company, than any other word in the foundrymen's vocabulary.

Many Factors Responsible

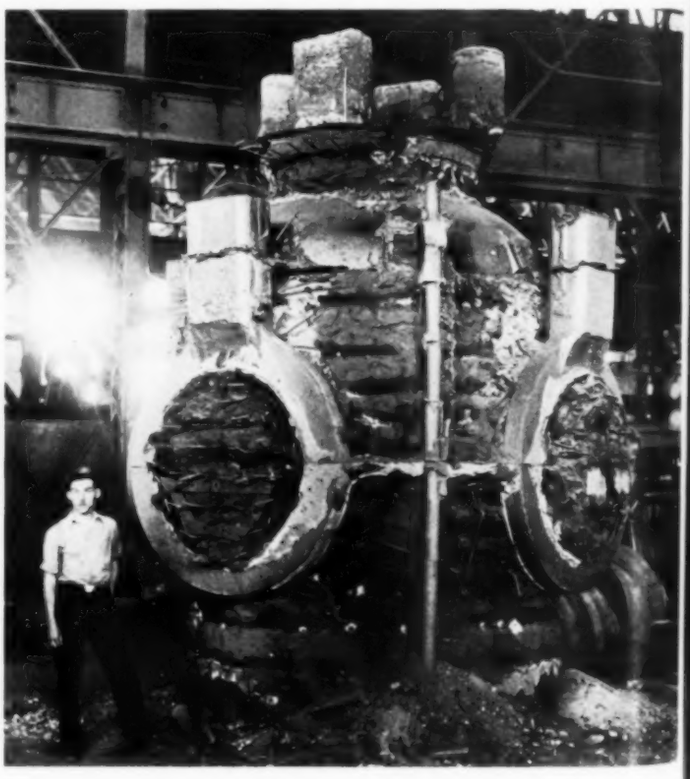
Since yield is based on the furnace charge, all intermediate losses between the weight of the charge and the shipping weight of the castings help to reduce the yield. Therefore it readily can be seen that one loss is just as important as another. Singly or in the aggregate they lower the yield figure. Because the foundry department controls most of the influences that govern the yield, it may be well to refer to some of the contributing factors that they may be studied and used to the greatest advantage. The factors include molding, heading and gating, use and design or shape of the chills, venting necessary to produce solid castings. While studying these various factors the foundryman also should keep in mind that sound economy increases profits.

The gate should be designed and placed to permit metal to enter the mold with the least resistance and action on the face of the mold. The metal should flow into the mold freely, quickly and in a manner to prevent agitation. Gates are made up of various designs or shapes, each shaped gate having its own particular purpose. Therefore the gate design and the casting to be poured must be studied together to assure the best results.

Risers or heads have four real purposes. 1. To relieve strain or hard pouring. 2. To aid circulation through the mold. 3. To entrap or hold foreign matter from the casting. 4. To feed the casting against shrinkage.

A riser is a molding tribute to shrinkage or contraction. Contraction is a decrease in the vol-

From a paper presented at a foundry meeting in Montreal. The author is production engineer, Canadian Car & Foundry Co., Steel Foundry division, Longue Pointe, Montreal, Quebec



By J. B. ATKINSON
Production Engineer
Steel Foundry Division
Canadian Car & Foundry Co.,
Longue Pointe, Montreal, Que.

Yield

ume of metal body, the mass remaining the same. Shrinkage is an exaction and is common to all metals. There is no absolutely nonshrinkable metal.

While fully appreciating the importance of the feeding riser, the size, shape and location must be studied carefully. The first consideration is to place it at the point of greatest advantage and to make the size of the neck cover fully the zone of final loss. Every casting or casting section solidifies inward from all bounding surfaces to the center of its mass or heavier section, and draws on the immediate liquid metal of the casting to feed the in-moving freezing mass.

The casting feeds itself automatically up to a certain depth of freezing metal, but cannot feed itself to the freezing heart, the last point which solidifies. To safely overstretch the final freezing zone, is to determine correctly the area of the casting surface covered by the feeding riser.

The next step is to arrange for a heavy supply of metal above the attaching surface. This supply will keep its fluidity and continue feeding to the final freezing of the mass center beneath or beyond the neck. Therefore the neck must not be too long, never more than ½ to 1-inch and should enlarge at once into the head diameter proper.

Regarding the general shape of riser, the round type is the most bulky of all practical forms, and contains greater volume per surface area than any other practical form of riser. The head in itself, has a feeding capacity equal only to the size of the neck. When the neck freezes, the head no longer can function as a feeder. Thus it is advisable to pour the feeding metal into the head immediately after the mold itself has been poured, so that the hottest metal is feeding into the section to eliminate all possible shrinkage that will occur in the casting immediately below.

Large Head Necessary

Experience indicates that the cross sectional neck area at least should be 30 per cent of the head area, and the height of the head never more than one and a half times the diameter. When the neck of a head is only equal to the size of the flange or section to which it is attached, its real purpose is lost and little is gained through such location or practice. Several smaller heads with equal neck capacity will prove far more effective than one large head throttled by a poorly proportioned neck. After a mold is properly headed and gated, full care must be taken that good joints have been made to prevent fins, since fins can play a big part in the reduction of yield. The core room can be of great help by properly gaging the cores to core print sizes. Fins exceeding core print specification not only reduce yield but often allow the metal to get into vents. The result of this is blown castings either scrapped by the inspectors, or rejected by the customer for some defect that develops during the machining operation. Accurate placing of cores and lack of rubbing or filing of cores all help in reduction of fins.

Vents facilitate escape of gas from the core or mold. This is a quick (*Please turn to page* 94)

Typical large steel casting cleaned and ready for shipment. The same casting just after it was shaken out is shown on the opposite page, with gates, sprue and risers attached

Glass Molds PRESENT MANY PROBLEMS

By ROBERT M. SCAFE

Fig. 1—Typical assortment of cast iron molds in which glass is formed. In addition to qualities which resist changes in temperature, the molds must be machinable and able to withstand hard service over long periods

THOUGH the origin of the art or science of glass making is lost in antiquity it is reasonable to assume that one of today's problems, molds and mold making materials, was encountered early in the history of the industry. Still visible on the tombs of ancient Thebes are tracings of glass artisans shaping and forming glass by the use of blowpipes, peculiarly parallel to the modern methods of offhand glass manufacture. From the interior of these same tombs have come specimens of glass coins impressed on both sides with hieroglyphic characters, substantial evidence that the early Egyptians possessed knowledge of pressing glass in metallic molds.

Ancients Made Glass

In glass making itself these ancient artisans displayed a remarkable ingenuity in the invention and production of decorative effects and manipulative methods. This same energy and ingenuity probably was used in the development of methods to best produce the desired results. Glass making was a highly regarded and secret operation but there is considerable factual evidence of the use of molds of some material or another dating back to about 4000 B. C.

Molds have been made of almost any conceivable material. Clay probably was the first and has continued in use through the centuries. In fact clay molds still are in use for the manufacture of some glass articles. Early German workers used hardwood molds and discovered the possibility of giving the glass a luster or sheen by turning the ware in the charred mold. Today cast iron accounts for probably 99 per cent or more of the glass ware made in molds. Flat ware, window glass and glass of that nature lie outside the scope of the present discussion.

Advent of the Owens glass making machine in 1898 revolutionized not only the glass mak-

ing industry but also the mold making industry. High speed production required molds of a concordant material. For the past 40 years the ingenuity and imagination of the foundryman, glass maker, and, in more recent years, the metallurgist, have been devoted to the development of suitable mold materials. Suitable molds to shape and form the glass of tomorrow at tomorrow's rate of production are going to demand the utmost in co-operation between maker and user.

Present discussion is confined to a survey of the utility of the mold, what it does and what it must withstand in actual production; mold making requirements and a few of the economic problems which must be considered. Further, in relation to these requirements to discuss the value and use of some of the alloys suitable for foundry operations, particularly in cupola melting.

Value Measured By Performance

In the final analysis the worth or merit of any glass mold iron is measured not by theoretical yardsticks, but by actual performance on the glass machine as measured in units of production per cleaning or re-dressing, total production life, and its effect upon the glass itself in luster and finish. Primary function of the mold is the production at a reasonable cost of a commercially satisfactory and salable article conforming to the desired design and capacity. This may sound somewhat academic but in the enthusiasm to try something it might be advisable to keep in mind the ultimate utility of the mold. Other things being equal the analysis which will produce these desired results at the loweset cost will prove to be the most acceptable.

Depending on glass making methods and type or style of ware, molds may be classified as solid or split. Solid molds, generally consisting of the mold body and such appurtenances as valves and plungers ordinarily are used in the production of press ware. Split molds, the body in two, three or more parts with such working parts as bottoms, baffle plates, neck rings, and plunger, may be used for either press or blown ware. Blown ware ordinarily may be given a preliminary press to form the neck and ring. This is done in either the mold or a blank from which the glass is transferred to a mold for blowing. Attempt to describe all the variations which may be encountered in operating technique, would lead too far afield.

Techniques and methods vary so much from plant to plant, as between types of glass making machines, and between the different grades and classifications of glass it seems advisable in the present instance to confine comment to a few operations which are usual or common to glass making and which are of particular interest to the founder engaged or hoping to be engaged in the manufacture of glass mold irons. There are three operations of interest in glass making: Pouring, pressing and the takeout. True, there are other operations but an investigation of these three principles with reference to the others will demonstrate actual service conditions and the reaction of the mold to work.

At the first station the comparatively simple operation of dropping a gob of glass into the mold or blank sets in motion a sequence of events which not only makes glassware but serves as a proving ground for the product of the founder and mold maker. A gob of glass varying in weight (*Please turn to page* 103)

Fig. 2—Glass factory molds are machined to a high degree of accuracy and the various parts, hinged or otherwise fitted together, must be in position to be manipulated easily and readily by the operator

A·S·T·M

CONSIDERS STANDARDS AND MILITARY PREPAREDNESS

THROUGHOUT the various sessions of the forty-third annual meeting of the American Society for Testing Materials, held at the Chalfonte-Haddon Hall, Atlantic City, N. J., June 24 to 28, consideration was given to the part that the society and its specifications must play in the military program of this country. A feature of the opening session was the address by Lt. Col. William C. Young, planning branch office of the assistant secretary of war, Washington, on "Materials Standards in National Preparedness." Col. Young stated the question of material standards is a most important element in national preparedness for reducing the time factor in reaching quantity production of military equipment and supplies. Without these standards there would be much delay, not only in production of semifabricated materials, but also in processing them through the various stages of manufacture to the finished article.

W. M. Barr
President of A.S.T.M.

According to Col. Young, planning to reduce the time factor has developed the following four questions: 1. What is wanted; 2. How many are wanted; 3. Where can the equipment be obtained; and 4. How can these supplies be obtained in the time and quantity desired. When it is considered there are some 70,000 items on the supply lists of the military units of the army, an idea of the magnitude of the problem is manifest. While, as the speaker stated, the best plan for procurement is actual production orders in the plant for the item which it is expected to make in time of war, this is impossible in most instances. Therefore, the educational order, requiring the manufacture of only a small quantity of the item, or production studies which is really a factory production plan, have been used. Educational orders are intended to establish a technique of manufacture, to provide a factory plan based on experience and a skeleton set of manufacturing equipment. The speaker estimated that quantity production would be advanced from 4 to 12 months in those plants which have experience through educational orders. Col. Young then discussed the importance of standards for materials in the industrial mobilization plan.

H. H. Morgan, Robert W. Hunt Co., Chicago, and retiring president of the society stressed the commercial importance of the standard specifications for materials in addressing the opening meeting. Mr. Morgan stated the practical importance of specifications hinges directly on ability to assure the buyer that he is receiving exactly the goods ordered. In the competition of trade, particularly in regard to heavy products under mass production, it is essential to know that materials are supplied according to specification. Adequate specifications with competent inspection assure the buyer a maximum usefulness and serviceability of material at a minimum of cost. Most buyers cannot maintain the expert personnel to prepare specifications, so that the standard specifications are utilized. The speaker then pointed out that because of the methods followed in developing A.S.T.M. specifications, they represent a character of specification providing maximum commercial importance.

Registration of members, committee members and visitors, totaling 1441, exceeded the previous Atlantic City (*Please turn to page* 100)

Patterns AND Pattern Design FOR NONFERROUS FOUNDRIES

PATTERNS in nonferrous foundries have not been given proper study and consideration, largely because of usual conditions that prevail in the production of nonferrous castings. Almost always the last part of a mechanical unit to be designed is that for which nonferrous metals are to be used. Consequently, when castings are to be made they are ordered hastily at the eleventh hour. Patterns are produced with undue haste and almost invariably are a compromise with that which would be used were the time not such an important factor.

Patterns May Be Improved

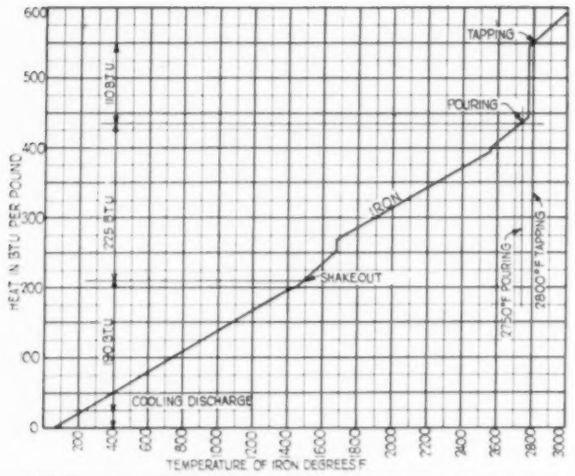
Designers would find that much economy could be secured if the castings to be made in the nonferrous metals were given consideration in ample time to permit the proper study necessary to produce patterns for economical production of best quality castings. Too often, to make an apparent saving, a pattern is used that was not designed for the case at hand, or which will produce a casting to the dimensions required only by excessive machining at the expense of waste of material, and machine shop costs. Both could be eliminated by use of proper patterns.

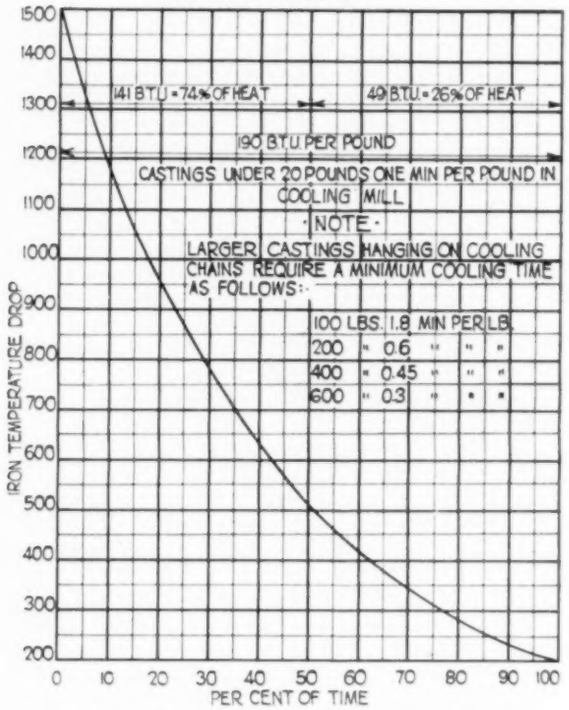
When the proper pattern for a given part is available, just the right amount of finish allowance is provided. When the casting has been machined to finished dimensions, it is not a piece of metal the best of which has been removed in the form of chips. The correct pattern will enable foundrymen to make a sounder casting because it has been designed to permit molding in the proper position to insure maximum soundness and complete feeding of all parts during solidification.

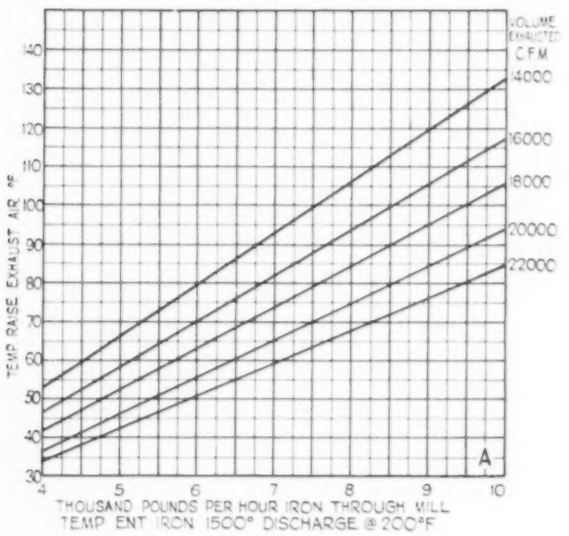
Conference Should Be Held

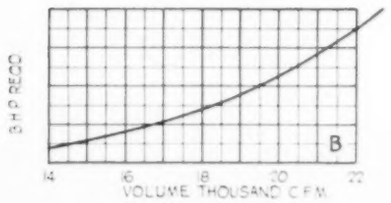
The proper pattern can be determined best by a conference between the designer or user of the casting and a competent foundryman with the requisite experience in the production of castings in the alloy in question. Different alloys do not act alike during solidification and consequently require different gating and different provisions for risers, etc. Few patternmakers are competent to decide what constitutes the most desirable pattern for a given part. Moreover, the number of parts to be cast influences the type of pattern. Where there are large quantities to be produced, it frequently will be economical to make some actual experiments to determine the best type of patterns and arrangement in the mold before mass production patterns are attempted.

The American Foundrymen's association in conjunction with other interested associations and bodies has estab- (*Please turn to page* 106)




IRON TEMPERATURE DROP
PER CENT OF TIME
141 B.T.U. = 74% OF HEAT
49 B.T.U. = 26% OF HEAT
190 B.T.U PER POUND
CASTINGS UNDER 20 POUNDS ONE MIN PER POUND IN COOLING MILL
·NOTE·
LARGER CASTINGS HANGING ON COOLING CHAINS REQUIRE A MINIMUM COOLING TIME AS FOLLOWS:-
100 LBS. 1.8 MIN PER LB.
200 " 0.6 " " "
400 " 0.45 " " "
600 " 0.3 " " "





INVESTIGATES COOLING

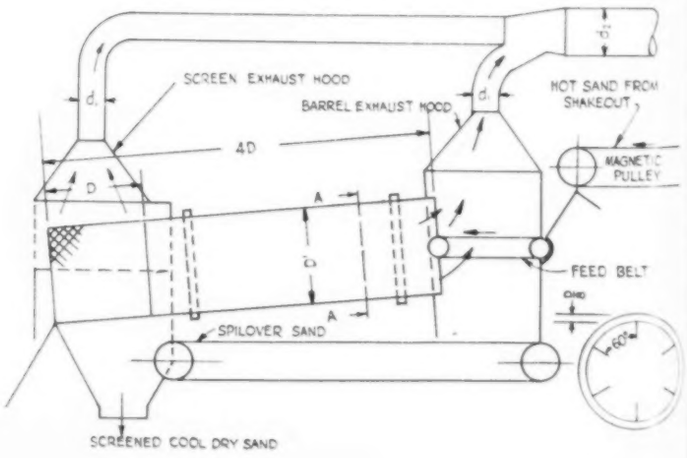
By F. H. AMOS

RECENT investigation of casting and molding sand cooling under average shop conditions shows a definite relation with certain properties of these materials. In seeking an explanation, it was found that theoretical calculations agreed very closely with results obtained in actual practice.

Since the heat originally comes from the molten iron, it is necessary first to ascertain the amount of heat involved. Fig. 1 was prepared for that purpose. This graph is a standard iron heat capacity chart, on which points representing various foundry operations have been imposed. In this case, the cupola was tapped at 2800 degrees Fahr. and the temperature of metal poured was 2750 degrees Fahr., showing a heat loss of 110 B.t.u. From pouring to shakeout at 1500 degrees Fahr. the loss is 225 B.t.u. per pound. Part of this heat is absorbed by the molding sand and the rest is expended in evaporation and radiation as shown on Fig. 5 for cooling rate in molds.

It readily will be appreciated that the exact amount of heat for raising the temperature of

Fig. 1 (Upper Left)—Heat capacities of iron at various temperatures, degrees Fahr. Fig. 2 (Center)—Cooling rate of iron from shakeout to 200 degrees Fahr. Fig. 3 (Lower Left)—Raise in temperature of exhaust air at A, and brake horsepower required at B. Fig. 4 (Below)—Sketch of cooling mill. Fig. 5 (Right)—Cooling rate of casting in mold



PROBLEM OF

the mold and also that required for evaporation never can be separated. However, a great many temperature and moisture tests immediately after the shakeout indicated that the amounts shown on the calculation sheets, Tables I and II, were close to what actually takes place at this point in the heat exchange. Also, the final sand temperatures sustained these data. It seems that the only way to cool molding sand for continuous high production units is by evaporation of moisture in the sand after shakeout. When the moisture drops below a certain point, the sand in the conditioning unit gradually increases in temperature and this rate of increase is directly proportional to (*Please turn to page* 92)

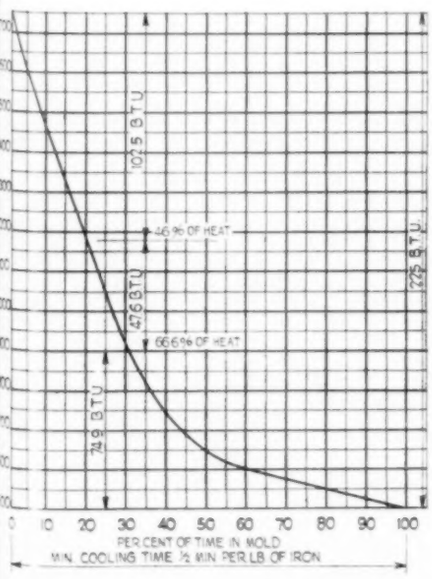


Table I

Sand Temperature and Heat

Problem
20 Pounds of metal poured @ 2750°F.
Shakeout temperature of metal 1500°F.
Shakeout temperature of sand 220°F.
Sand ratio 5 to 1 = (100 lb.)
Moisture content as tempered 5 per cent or 5 lb.
Desired sand temperature 80°F.
Foundry air 70°F.

A—Heat Released by Iron
1. 20 lb. iron @ 2750°F. to 1500°F.
2. See Graph No. 1—20 x 225 = 4500 B.t.u.

B—Sand and Moisture Involved
1. Weight of sand and moisture 100 lb.
2. Weight of sand 95 lb.
3. Weight of moisture 5 lb.

C—Heat Loss per Pound of Moisture Evaporated

1.	Heat required to raise one pound H_2O from 80°F. to 212°F. =	130
2.	Heat in vapor (latent heat)	971
3.	Total heat of moisture evaporation	1101

D—Heat Loss While in Mold

1.	Sand raised from 80°F. to 220°F. = (220—80) × 95 × 0.195 =	2593 B.t.u.
2.	Moisture raised 80° to 212°F. = (212—80) × 1 × 5 =	660 B.t.u.
3.	4 per cent radiation losses = 4500 × 0.04	180 B.t.u.
4.	Heat absorbed and lost in mold	3433 B.t.u.
5.	Heat of evaporation (mold = 4500—3433) =	1067 B.t.u.
	Heat balance =	4500 B.t.u.

E—Heat of Evaporation
1. $D_1 - D_2 = 2593 - 660 = 3253$ B.t.u. Heat Absorbed
2. D_5 Mold Evaporation — 1067 B.t.u. Heat Absorbed

Total heat for evaporation. 4320 B.t.u.

F—Moisture Loss
1. $D_5/C_3 = \frac{1067}{1101} = 0.95$ lb. loss in mold, or approximately 1 per cent.
2. $\frac{D_1 + (D_2 - 0.95 \times 130)}{1101} = 2.84$ loss in sand system.
3. Total moisture loss = 2.84 + 0.95 = 3.79 lb.
   Excess = 5 — 3.79 = 1.21 lb.

G—Ventilation Required, Assuming System Loss All Takes Place in Barrel at 212°F. and 29.92 inches Barometric Pressure

Volume per lb. of sand = $\frac{F_2 \times \text{Sp. Vol.}}{100}$

Where Sp. Vol. = specific volume @ 212°F. and 29.92 inches barometric pressure or 26.79 cubic feet.

$$\frac{2.84 \times 26.79}{100} = 0.76 \text{ cubic feet}$$

Table II

Heat and Temperatures

Problem
500 pounds of metal poured @ 2750°F.
Shakeout @ 1500°F.
450 pounds core sand that remain in casting.
Sand ratio 4 to 1, or 2000 pounds tempered.
4 per cent moisture, or 80 pounds.
Desired sand temperature 80°F.
Foundry air 70°F.
Shakeout sand temperature 220°F.

A—Heat Released by Iron
1. 500 pounds @ 2750°F. reduced to 1500°F.
2. See graph No. 1 — 500 × 225 = 112,500 B.t.u.

B—Sand and Moisture Involved
1. Weight of sand and moisture 2000 pounds.
2. Weight of sand 96 per cent or 1920 pounds.
3. Weight of moisture 4 per cent or 80 pounds.

C—Heat Loss Per Pound of Moisture Evaporated
Same as shown in Table I

D—Heat Loss While Iron is in Mold

1.	Sand raised from 80°F. to 220°F. = (220 — 80) × 1920 × 0.195 =	52,416 B.t.u.
1	(a). Core sand raised from 80° to 220°F. = (220 — 80) × 450 × 0.195 =	12,285 B.t.u.
2.	Moisture raised from 80° to 212°F. = 130 × 1 × 80 =	10,400 B.t.u.
3.	4 per cent radiation losses = 112,500 × 0.04 =	4,500 B.t.u.
4.	Heat absorbed and lost in mold	79,601 B.t.u.
5.	Heat of evaporation in mold = 112,500 — 79,601 =	32,899 B.t.u.
	Heat balance =	112,500 B.t.u.

E—Heat of Evaporation
1. $D_1 - D_2 = 52,416 + 10,400 = 62,816$ B.t.u. for evaporation.
2. D_5 mold evaporation = 32,899 B.t.u.

Total heat for evaporation = 95,715 B.t.u.

F—Moisture Loss
1. Moisture loss in mold = $D_5/C_3 = \frac{32,899}{1101} = 29.88$ lb.
2. Moisture loss in sand $\frac{D_1 + (D_2 - (29.88 \times 130)}{1101} = 53.52$ lb.
3. Total moisture evaporated 29.88 + 53.52 — 83.4.
4. Moisture deficiency 83.4 — 80 = 3.4 lb. or 0.41 per cent.

G—Ventilation Required, Assuming That 0.41 Per Cent Moisture Has Been Added
1. Volume of exhaust per pound of sand = $\frac{53.52 \times 26.79}{2000} = 0.72$ cubic feet.

Questions and Answers

Mixture for White Iron Castings Depends upon Requirements

We are figuring on some castings to be made of white or hard iron. What mixture is required for this class of castings. Where can we secure the pig iron?

White iron for castings is a generic term based on the color of the fracture, which is due to absence of free graphitic carbon. All, or practically all the carbon is in the combined form. Mixtures to produce iron of this kind show a wide range and depend to a great extent on the purpose for which the castings are intended. For example a miscellaneous mixture of gray iron, malleable and steel scrap is suitable for sash weight castings. The same metal would be of little service in crusher jaws or other castings subjected to severe wear or impact shock.

Typical analysis for white iron shows: Silicon below 0.75 per cent, manganese above 0.20 per cent, sulphur below 0.25 per cent, phosphorus below 0.75 per cent, total carbon above 2.50 per cent. Silicon and carbon in the charge are regulated principally by addition of steel scrap. Special properties such as resistance to shock, wear and corrosion, are secured through addition of pig iron and alloys. Lacking a knowledge of the castings you have in mind we cannot suggest a specific mixture, but with the foregoing general outline you can readily determine the relative amounts of the component parts. Low silicon pig iron is supplied by the various pig iron producers listed in the advertising section of THE FOUNDRY.

Small Ratchet Shows Abnormal Shrinkage Cavity on Top

We are forwarding two small solid ratchet wheels 3 inches diameter with a boss 1¼ x 1⅝-inches attached off center on the drag side. The patterns are mounted four on a plate, but the metal is poured into each mold separately through a 1-inch diameter pop gate in the center. Castings show abnormal shrinkage cavities. Cupola mixture contains half pig and half scrap. The pig iron analysis follows: Silicon 3.20 per cent, sulphur 0.024 per cent, phosphorus 0.57 per cent, manganese 0.90 per cent. Will you kindly check analysis of the castings and suggest a remedy for the present trouble?

Shrink holes in the castings are caused by faulty molding practice. Metal is quite satisfactory, although tips of the teeth show that it was poured at a comparatively low temperature, probably deliberately in an attempt to prevent the formation of shrinkage cavities. With the four castings projecting deeply into the drag, the volume of steam generated in the sand between is greater than usual. Presumably the bottom board is squeezed into place.

The steam cannot escape readily and a certain amount is trapped by the metal. This produces bubbles over which a shell freezes rapidly and prevents the metal on top from sinking gradually to form a homogenous casting. The steam also causes the metal in the gate to freeze rapidly and set before the metal sets in the boss on the bottom of the casting. Obviously the remedy is to vent between the castings, lift the bottom board and scratch a channel between sand and board in the form of a cross to permit the steam to escape readily. Increase the size of the pop gate in the form of an inverted cone to provide a more adequate supply of feeding metal.

Cast Steel Nose for Airplane Bomb Should Shatter Easily

We are operating a foundry in the Balkans and have been asked to make cast steel airplane bombs. We will appreciate your views relative to an analysis to obtain the most suitable mechanical properties. Steel for the castings will be melted in an oil fired, rotary furnace in which the temperature can be raised to 1650 degrees Cent. We should also like to know if the castings should receive a heat treatment.

The drawing enclosed with your inquiry shows a nose casting for an airplane bomb approximately 12 inches in diameter. Unfortunately, you leave it to our imagination to figure out just what are the most suitable mechanical properties for the casting. However, we believe that the particular casting is not intended for an armor piercing bomb, which we understand is being made to penetrate deck armor on lighter ships. If it were, it undoubtedly would be a forging instead of a casting, and made of an alloy steel containing say 0.50 per cent carbon, 0.60 per cent chromium, and 1.50 per cent nickel—annealed, hardened and tempered.

Therefore, we suppose the bomb is a plain affair designed to explode and shatter on contact, that it is desired that this casting should fragment on detonation of the bomb so as to produce a shower of fragments. If that is the idea we would suggest an analysis of 0.40 to 0.50 per cent carbon, 0.30 to 0.40 per cent silicon and 0.60 to 0.70 per cent manganese. Phosphorus and sulphur will have to be whatever

you can obtain with raw materials available, presumably, not over say 0.07 or 0.08 per cent.

Still going on the assumption that you want the bomb nose to shatter, we would dispense with heat treatment, or at the most use a very short anneal at 900 degrees Cent.—not over one-half hour at that temperature after the castings are heated all the way through. That treatment will make the steel rather brittle under impact so that it will shatter well on detonating. We are not familiar with the practice in oil fired, rotary furnaces such as you will use, but we rather suspect that you will not find it easy to get the steel hot enough to pour this rather light job in quantities. It is partly for that reason that we suggest a comparatively high carbon content, since the lower carbon steels need to be hotter to run light sections.

Large Gray Iron Pulley Faces Show Porous Spots in Grooves

We make cast iron pulleys in many sizes up to 72 inches diameter and 26-inch face, later machined for v-belt drive. Porous spots show up in the base of the grooves opposite the ends of the arms. Molds are green sand for the rim and dry sand cores for the hub and arms. Metal is poured through two pop gates on the hub and we feed the castings through two risers on the hub and a riser on the rim over each arm. Cupola mixture contains 60 per cent heavy machinery scrap, 20 per cent steel and 20 per cent pig iron of the following analysis: Silicon 2.25 per cent, sulphur 0.023 per cent, phosphorus 0.70 per cent, manganese 1.00 per cent.

On account of subsequent machining, the thickness of the rim as cast is out of proportion to other parts of the casting. Consequently shrinkage is not uniform or evenly distributed. Conditions are aggravated to a further extent where the rim is molded in green sand and the metal solidifies rapidly. Arms and hub encased in dry sand cores remain fluid for a longer time. These parts of the casting also contain the hottest metal since they are nearest to the gates on top of the hub. Ends of the arms next to the hub draw iron from this reservoir while the hub is fed from risers. Ends next to the rim draw iron from the rim for a brief period, or until the rim freezes. Before this drawing action is complete, iron in the rim either has set or is too sluggish to move resulting in a porous area opposite the ends of the arms.

In some instances it is possible to prevent local segregation by a change in composition of the iron, either in the cupola or by addition of small amounts of alloy at the spout. Minor manipulation of the mold in other instances will accomplish desired result. Chill blocks are placed above and below the arms at the junction with the rim. A light chill plate sometimes is placed against the face on the outside. In other instances a short piece of dry sand core is inserted in a print on the outside face to form part of the groove at that point. Interior chills, spirals, spikes or short pieces of steel rod may be employed to cool the metal rapidly in the affected area and thus promote uniform shrinkage.

Molding Sand Burns onto Face Of Small Flywheel Casting

We are having trouble with sand burning on to the face of a small flywheel 14 inches diameter with rim thickness of 1¼-inches and with four fan shape arms ⅛-inch thick. Casting is gated at two points on the rim from a runner served by two pencil sprues fed by a basin on the cope. We use No. 2 Albany sand grade *D*. Facing mixture contains 8 parts new sand, 8 parts old sand and 2 parts sea coal. The castings are tumbled for 3 hours, but this treatment does not remove areas where the sand is burned on to the face. We have to pour the metal at a high temperature, about 2300 degrees, to run the thin spokes. Can you suggest a facing that will produce a clean, smooth surface on these castings?

Temporary relief for your problem may be secured by adding a little cereal binder, say 1 shovel to 25 of facing sand. However, some of the conditions you describe do not conform to ordinarily accepted foundry theory and practice. For example the facing sand you describe should peel readily from the rim of a small wheel 1¼ inches thick. If the sand should stick or burn anyplace, we should anticipate finding this condition on the inside of the rim where shrinkage and contraction keep the metal in close contact with the sand. Contact with the outside of the rim is only temporary. A tumbling barrel should clean the castings in half an hour instead of 3 hours. Surely your reference to pouring metal at 2300 degrees (presumably Fahr.) is a slip of the pen. At that temperature the metal would freeze in the gate.

Condenser Header Shows Leaks Under Pressure Testing

We are enclosing blue print of a cast iron condenser header 4 feet 8 inches in length. A boxed casting ¾-inch thick top and bottom, one side wall 1-inch thick and the other 1¼ inches thick. A partition wall divides the casting longitudinally into two chambers. Our customer drills 1-inch holes on one side and 1¼-inch holes on the opposite side for pipe connections. After the castings are cleaned they are water tested at 225 pounds per square inch pressure. They pass this test readily. After they are machined and assembled they are tested again and water seeps through between the pipe plugs on the thick side. Iron shows the following analysis: Silicon 1.89 per cent, manganese 0.67 per cent, graphite carbon 2.72 per cent, total carbon 3.13 per cent, phosphorus 0.41 per cent, sulphur 0.124 per cent, chromium 0.29 per cent, nickel 1.18 per cent. The castings are gated at one end.

Since the casting is gated only at one end, a possibility exists that a mild form of cold shut may have developed in the side wall and became exposed when the holes were drilled for the plugs. However, the most probable cause of the trouble is lack of proper venting in the core. With the exception of the nozzle opening the entire core is surrounded by metal. Since the excessive amount of gas cannot escape rapidly enough it causes a mild fluttering in the metal with a resulting porous structure. Obviously the remedy is to provide a core, merely a shell of sand filled with coke or cinders, and with a large vent opening through the nozzle.

Castings from Same Pot Vary

We are sending two brass castings which were poured from the same pot. One is red and the other yellow. The crucible was charged with yellow brass scrap, and stirred well before pouring

Fracture of both castings indicates that they are of the same composition as far as structure is concerned. Difference in color probably is due to a difference in moisture content of the sands in the molds used. A moist sand causes more rapid cooling than a drier sand so that the skin formed on the castings differ in color. It is well to point out that the surface of the red skinned casting indicates a cold shut, thus indicating that it was poured at a temperature sufficiently lower to permit more rapid cooling.

Makes Monel Sleeve For a Shaft

We have been asked to make a sleeve for a shaft which works in a rubber cutless bearing. It is 5 inches inside diameter and 27 inches long with a metal thickness of 1-inch. The old sleeve was white in color so we tried a nickel silver alloy containing 20 per cent nickel, but had difficulty in that the metal gassed badly. Can you tell us how to overcome the trouble? Also, can you give us any information on a suitable composition for a high speed bronze?

While the nickel silver alloy you mentioned might work satisfactorily, it is our opinion that the old sleeve was made from monel metal. Evidently there is a problem of corrosion present in the particular application, and monel metal is more suitable. Your trouble with gassing evidently is due to improper deoxidation and degasification, and unless a definite procedure is followed, you always will have trouble with high nickel alloys.

Monel metal contains about 67 per cent nickel, 29 per cent copper, 2 per cent iron, 0.75 per cent manganese, and 1.0 to 2.0 per cent silicon. Molding of monel metal is similar to that of steel. Consequently your risers and sink heads should be placed so that good feeding is obtained, and they should be large in size. The minimum amount of binder and moisture should be used in the sand since monel metal and other high nickel alloys are sensitive to gases generated in the mold. The sand, of course, should be highly refractory, and vented well to allow easy escape of the gases.

It is advisable to pour the casting in a dry sand mold. Just before drying the mold the face should be sprayed with a mixture of equal parts of water and linseed oil and then coated with a mixture of equal parts of black lead or graphite and clay. If ingot monel metal is used, approximately 1½ ounces of metallic silicon should be added for each 100 pounds of metal. The ingot is melted rapidly in an oil fired furnace and about 5 minutes before pouring, the silicon is added and stirred in well with a wooden pole. Just before pouring, 1½ ounces of magnesium metal per 100 pounds of metal is added. The magnesium must be plunged well below the surface and stirred for a few seconds to insure proper diffusion. Pouring temperature should be from 2700 to 2750 degrees Fahr.

So far as we know there is no specific alloy termed high speed bronze. One containing 73 to 78 per cent copper, 5 to 10 per cent tin, and 15 to 20 per cent lead is used for car journal bearings, driving box brasses, etc. Another containing 63 to 75 per cent copper, up to 5 per cent tin and 25 to 35 per cent lead, is used for high speed service and light loads.

Cast Iron Used for Permanent Mold

We are contemplating use of permanent molds for an alloy composition containing copper 75 to 80 per cent; tin 5 to 10 per cent and lead 10 to 15 per cent. We shall appreciate information on the proper composition for the molds. We understand that the molds in some foundries are cast iron, or other ferrous metal, while other foundries use compositions containing graphite, asbestos, etc. What are the advantages and disadvantages of the various types?

The subject is so broad and presents so many factors for consideration that a satisfactory reply is impossible in the space at our disposal. However, brief reference to a few items may serve your immediate purpose. While it is true that materials other than metal, for example, graphite, asbestos, plaster, rubber, etc., are employed to form molds, their use is limited to the production of one, or in some instances a few castings. They are not permanent molds in any sense. For long production runs, the molds are either cast iron or steel.

Type, composition and design depend on the size, weight and shape of the castings to be made in them. Practically each one presents individual problems, solvable only by an expert equipped with long practical experience. Bronze molds are employed extensively for making comparatively light, thin castings by the so-called slush mold process. The mold, in two or more parts, is filled with metal and allowed to stand until a shell of metal has solidified next to the face of the mold. The mold then is inverted and the remainder of the molten metal is spilled out. You might consult *Die Casting Practice*, by Marc Stern. Devoted to the subject indicated by the title, the book contains a great deal of useful information on molds and mold materials and design applicable to permanent molds for gravity and die casting. An unusually complete article on casting railroad bronzes in permanent molds, written by Henry Marius, appeared in the Jan. 1, 1930, issue of THE FOUNDRY, commencing on page 104.

Malleable Casting Shows Shrink

We are making a bell-shape casting from malleable cast iron, and are having difficulty with shrinks in the skirt in the drag section. The castings are made 4 in a mold, gated from a central sprue into an ear-like projection on the end opposite the flared skirt. A green sand core is used with a permeability of 50. Facing sand and backing sand have a permeability of 105. Increasing size and height of shrink heads has no effect, but increasing the metal thickness slightly did decrease shrinkage.

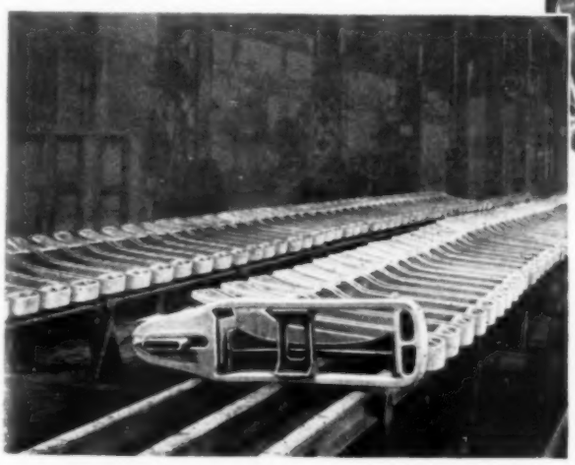
Your difficulty primarily is due to lack of feed into the heavier section in the skirt, which is borne out by your remarks on increasing the size and height of the shrink heads, and increasing the thickness of the section above the skirt. Consequently, the only way to remedy the situation is to increase the feed to that section by the usual methods of employing risers or shrink bobs of suitable size attached to the heavy section, or using some type chill which would increase the cooling rate of the heavy section comparable to that of the light section.

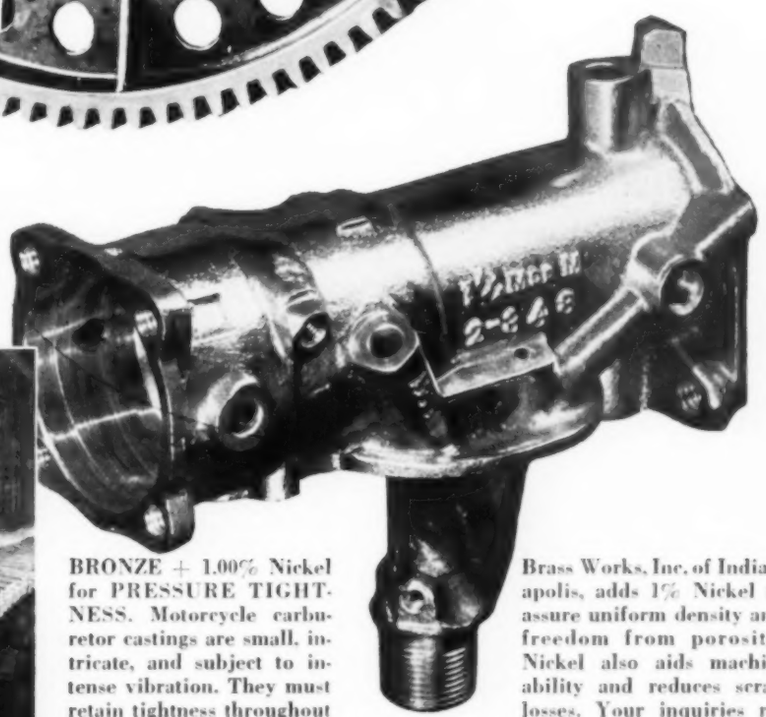
You indicate the green sand core has a permeability of 50 while that of the facing and backing sand is 105. Hence, the core is half as permeable as the molding sand, but is surrounded almost entirely by metal. Therefore you are in danger of trouble from core blows unless ample vents are supplied close to the core surface. You might try making the cores of the same material as the molding sand. Part of the trouble you mention may be due to the cores creating a slight kick back just sufficient to cause a slight disturbance, but not leave evidence of a core blow. In other words, the metal would tend to simmer or flutter on the core surface just before the skin forms, enclosing a small quantity of gas.

So little NICKEL makes these BIG IMPROVEMENTS

CAST IRON + 2.00% Nickel for INCREASED TOUGHNESS. 12-foot barking drum gears used in pulp and paper mills are subjected to wear and severe stresses. The Carthage Foundry & Machine Co., Carthage, N. Y., casts both gears and pinions from a Nickel alloyed iron of high machinable hardness and increased strength and toughness. With a 50% steel mixture the composition used for these gears is: T.C. 3.20%, Si 1.20%, Mn 0.90%, Ni 2.00%, and Cr 0.35%.

CAST STEEL + 1.25% Nickel for STRENGTH. Dead weight has long been a problem in the design of railroad rolling stock—particularly freight cars. To cut down excess weight and still secure sufficiently high strength and toughness to resist stresses to which freight car trucks are subjected in service, the Buckeye Steel Castings Co., Columbus, Ohio, cast these yokes, as well as side frames and bolsters, of a Nickel-manganese steel. Tests showed a tensile strength of 95,000 p.s.i. The composition is: C 0.28%, Mn 1.50%, Ni 1.25%, and Si 0.35%.





BRONZE + 1.00% Nickel for PRESSURE TIGHTNESS. Motorcycle carburetor castings are small, intricate, and subject to intense vibration. They must retain tightness throughout a wide range of temperatures. To the regular 85-5-5-5 bronze mixture Langen-kamp, Wheeler Brass Works, Inc. of Indianapolis, adds 1% Nickel to assure uniform density and freedom from porosity. Nickel also aids machinability and reduces scrap losses. Your inquiries regarding uses of Nickel in irons, steels and non-ferrous alloys are always welcome.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Melt Iron Borings In the Cupola

We shall appreciate your opinion on the best method of using cast iron and steel turnings and borings from the machine shop. We are too far from blast furnaces or steel works to ship this material profitably. Our 42-inch diameter cupola is in operation practically all the time.

The best way to utilize borings and turnings is to press them into briquets and incorporate the briquets in the cupola charge. However, the economy of this method hinges on the amount to be treated. Cost of operating a briqueting machine is comparatively light, but the volume of operation will determine whether the cost of the machine will be absorbed over a reasonable period. Where the amount of borings to be disposed of is only a few hundred pounds per day many foundries have adopted the method of packing the borings in tin cans or in stove pipe lengths.

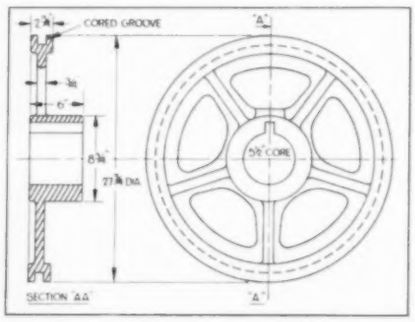
One end of the stove pipe is crimped and a disk of thin metal is placed in the bottom. The pipe is filled with borings either loose or packed down on a jolting machine. Another disk is placed on top and the edge of the pipe is crimped down on top. In another method the borings are mixed with a binding agent and rammed in a mold either by hand or on a molding machine. They are treated as cores and dried in an oven. A more or less complete list of binders includes tar, pitch, oils, sodium, silicate, calcium chloride, salammoniac, portland cement, lime water, clay wash and core gums.

Use Higher Head To Stop Shrinkage

We find shrinkage in the cored slot in the rim of a 27-inch diameter wheel spider as shown in the accompanying illustration. Mixture for this casting is made up of 40 per cent steel scrap, 25 per cent cast iron scrap and 35 per cent pig iron. Approximate analysis of the iron shows: Total carbon 3.13 per cent; manganese 0.48 per cent; phosphorus 0.47 per cent; sulphur 0.07 per cent; silicon 1.74 per cent.

Presumably the casting is molded and poured in the position shown, that is with the long hub in the drag and with a comparatively shallow cope. Presumably also the casting is gated in the usual manner through one or two small pop gates on the hub. The shrinkage in the cored slot in the rim of the wheel may be due to a lower pouring head and a small, low feeding head on the hub. With an inadequate supply of metal, the deep hub draws a certain amount from the rim. A high sprue and large, high riser on the hub will cure the trouble.

However, a possibility exists that the defect is caused by metal which does not lie lightly on the ring core, and not to shrinkage. Obviously if that is the case a different technique will be required. If the cavity disclosed by the cutting tool presents a ragged and torn appearance, you are fairly justified in the assumption that shrinkage is responsible. If the cavity or cavities pre-



Machining operation uncovers defective areas in the groove around the rim

sent a fairly smooth appearance, the core may be suspected. In some instances the cavities may be traced to a combination of the two causes. Close examination of the defect, preferably under a glass, will supply you with a clue on which to base your conclusions and the necessary remedial measure.

Wash for Iron Mold Builds up Face

We are making aluminum alloy castings in permanent molds and are having difficulty with the mold wash or dressing building up to the point that it must be ground off two or three times a day. How can we eliminate that trouble?

You do not mention what material you are using for the mold wash or dressing, but presumably it is clay suspended in water since it is used commonly. Apparently your trouble arises from use of too heavy a coating, and too frequent applications. In the first place the wash should be thin as far as consistency is concerned so that it may be sprayed on the mold face. Clay used should be finely ground to aid in suspensibility in water, and addition of about 5 to 10 per cent sodium silicate will be of considerable value in promoting suspension. Sometimes a small amount of graphite is added to the wash. The wash should not be used any more than is necessary, and may vary from applications twice a day to 5 times in 8 hours.

Let Vent Escape To Stop Shrinkage

We are forwarding a piece of condenser casting, the runner and gates and a sketch of the complete casting showing the general dimensions. We have tried several gating and pouring methods but our loss through a shrinkage defect is extremely high. The molds are double decked for pouring on a slope of 1-inch. They are poured at the high end. Iron is melted with a byproduct coke and shows the following average analysis: Silicon 2.30 per cent, manganese 0.50 per cent, phosphorus 0.52 per cent, sulphur 0.11 per cent, graphitic carbon 2.56 per cent, total carbon 3.22 per cent.

Neither the iron nor the gating arrangement is responsible for the shrinkage defect at the center of the outside of the hub. With the metal thickness in this casting, almost any type of gate would serve since its only function is to fill the mold in a reasonable time. However, instead of the half runner in the cope and half in the drag we should prefer to have the entire runner in the cope and the gates in the drag. Also in our opinion your present runner is about twice as deep and wide as necessary. Consequently, it is suggested that you cut down on the size so as to make it more reasonable.

The shrinkage defect in the casting is caused by steam from the mold or gas from the core or possibly a combination of both. In the mold for this particular casting, steam is produced in extra volume particularly around the hub. All the gas developed in a core almost entirely surrounded by metal has to pass through a single vent in each hub. Unless extra precautions are taken to provide free exit for the steam and gas, a certain amount will collect in the mold cavity and prevent the metal from filling the cavity properly. Since the back pressure created reduces proper flow of the molten metal.

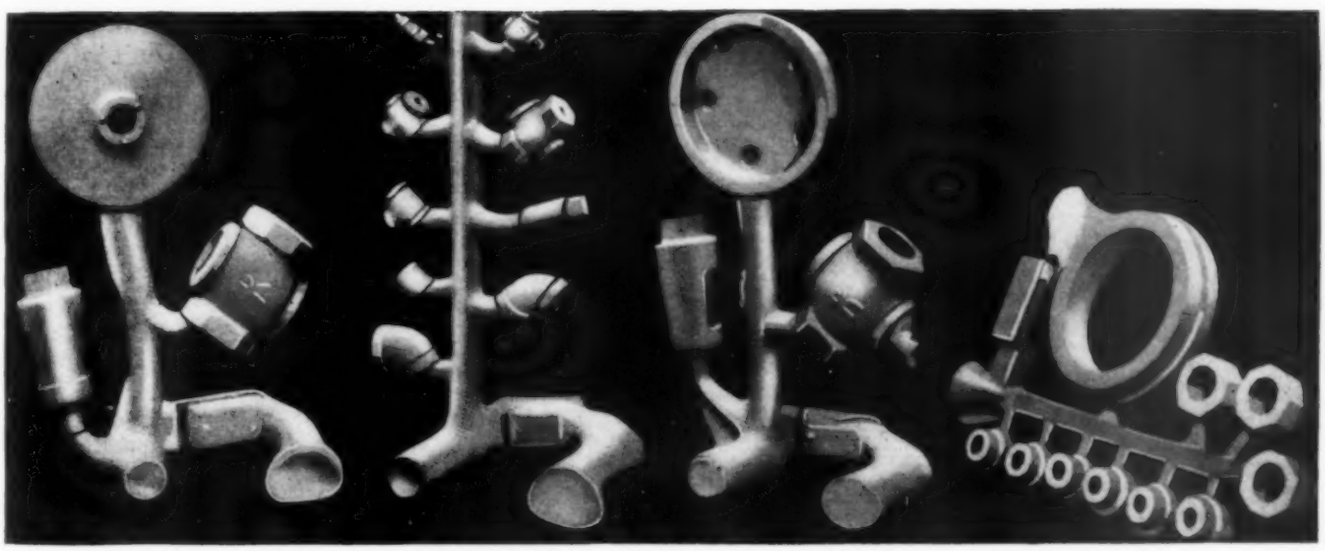
Some of the steam and gas will work clear, but only after it has developed a thin film of metal which prevents the surrounding metal from entering. A close inspection of the mold will show why the vent does not escape readily. It may be the cap core on the hub, or it may be a close fitting plate designed to hold the sand in the flask. Your sand may be rammed too hard or contain a little too much moisture. Any one or any combination of these factors may be present, but a close check by an experienced person will be necessary to place the blame for the defect exactly where it belongs. For a beginning we suggest venting around the hub, particularly in the pockets with a wire.

Why not try EVERDUR METAL for tin-free, high-strength bronze castings

Cast Everdur Drainage Fittings

They are tough, sound, machineable, and produced with regular brass foundry equipment

Cast Everdur Valve Parts



Small Everdur Castings—Methods of Gating and Molding

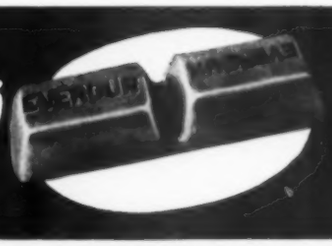
Everdur Metal is a development of metallurgical research in the field of engineering bronzes. For fifteen years, this tin-free, copper-silicon alloy has proved its value in the production of high-strength castings of both heavy and thin sections—for valves, fittings, and numerous other specialties.

Of great importance are Everdur's notable properties of corrosion resistance and ease of fabrication and handling in the foundry. The metal is furnished ready for use and can be melted and cast by regular brass and bronze foundry equipment...There are many other interesting details about the casting qualities of Everdur in a new bulletin. Ask for a copy. Just say: "Send me your new booklet on Everdur Ingots."

ANACONDA

(TIN-FREE)

Everdur Casting Ingots



THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

In Canada: Anaconda American Brass Ltd., New Toronto, Ont. • Subsidiary of Anaconda Copper Mining Company

EVERDUR IS A TRADE-MARK OF THE AMERICAN BRASS COMPANY, REGISTERED IN THE UNITED STATES PATENT OFFICE

MEN of INDUSTRY

JACOB A. EICHER, 79, retired foundry instructor at Michigan State college, East Lansing, Mich., was guest of honor at a dinner recently given by a large group of former faculty associates, students and outside friends. Dean H. B. Dirks delivered a happy and glowing eulogy on Mr. Eicher's career and services to the college. He worked as a molder from 1881 to 1914 in several foundry centers in Michigan, also in Milwaukee and in Los Angeles. In 1914 he was appointed foundry instructor in what then was known as Michigan Agricultural college. During his 21 years, 1914-1935, hundreds of Michigan State college engineering students received instruction at his hands in foundry practice. Many former students now occupy prominent places in the foundry industry.

• • •

THOMAS D. WEST II, recently was appointed foundry superintendent, the Symington-Gould Corp., Rochester, N. Y. Mr. West was graduated from the Case School of Applied Science as a mechanical engineer in 1930 and then worked at the Cleveland Tramrail division of the Cleveland Crane & Engineering Co., Wickliffe, O., in the iron foundry. After leaving there, he worked until recent months at the West Steel Casting Co., Cleveland. Mr. West is a member of the Buffalo Chapter of the A.F.A., and the Rochester Chapter of the A.S.M.

• • •

CARL A. GOSLINE, foundry foreman, John Deere Tractor Co., Waterloo, Iowa, recently was elected president of the Northern Iowa Foundrymen's association. Mr. Gosline was born in Batavia, Ill., in 1896. He was educated in the public schools of Beloit, Wis., and was graduated from the University of Wisconsin in 1918. During the World war he was with the 310th and 342nd infantry, starting as a private and later receiving a commission of second lieutenant. Mr. Gosline's first foundry experience was with the Beloit Foundry Co., in 1913 where his father was a partner. Following the war he worked for several firms as well as the Beloit Foundry Co. In 1928 he was connected with the foundry production and purchasing department of Fairbanks, Morse & Co., Three Rivers, Mich. In 1929 he joined the Covell-Hanchett Co., Chicago, in the piece rate and production departments, and the following year he became foundry foreman of the Nichols-Straith Co., Chicago. He joined the tractor firm in 1930.

• • •

JOHN M. PRICE for the past 5 years vice president, Ferro Machine & Foundry Co., Cleveland, has been elected president of the firm succeeding the late JAMES F. LEITCH. Mr. Price was born at Ironton, O. on Sept. 13, 1889 and received his primary education in the public schools of that city. Mr. Price was graduated in 1911 from Western Reserve university, Cleveland, with a bachelor of arts degree and from Case School of Applied Science, Cleveland in 1913 with a degree of bachelor of science in mining engineering. He began work in 1913 as chief engineer for Montreal Mining Co., Montreal, Wis., becoming

(*Continued on page* 44)

Jacob A. Eicher

Thomas D. West II

Carl A. Gosline

John M. Price

WOODWARD IRON COMPANY is the largest entirely independent and completely integrated company in the United States, engaged exclusively in the production of merchant pig iron. It is the only strictly independent merchant iron producer in the country that mines its own coal, ore, and limestone on its own properties and hauls all its products on its own railroads to its own furnaces. Since its establishment in 1883, its sole business has been that of making pig iron.

Properties of the Woodward Iron Company have been described as the "finest of their size in the world." They comprise 78,000 acres and contain the largest ore and coal reserves to be found in any area of comparable size, controlled and operated by a strictly merchant iron producing company. These reserves are vast enough to operate the present Woodward plant at peak capacity for well over a century, a condition which assures Woodward customers a uniform and dependable supply of pig iron, not only now, but long into the future.

By modernizing its operations, making large expenditures for new equipment of the latest type, instituting the best methods for control of furnace performance, this company within the last few years has brought its pig iron to a standard of uniformity which is now acclaimed by foundrymen throughout the country.

Latest addition to the long list of improvements which have been made in Woodward properties is the installation of *modern air-conditioning equipment* in furnace operations.

This air-conditioning—a scientific innovation in modern furnace practice—is designed to reduce and control the moisture in the air blast, hence to give still greater regularity in furnace operations and still greater uniformity in the output of merchant iron.

Throughout America wherever pig iron is used, Woodward iron is now sold.

WOODWARD IRON COMPANY

Woodward, Ala.

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

(*Continued from page 42*)

assistant superintendent of the Ottawa mine of the firm in 1916, and superintendent of the company in 1920. In 1925 he joined the Castile Mining Co., Ramsay, Mich., as superintendent, holding that position until 1929 when he became foreign representative for Oglebay, Norton & Co., Cleveland, in Soviet Russia. In 1935 he was elected vice president of the Ferro Machine & Foundry Co.

HENRY B. MYERS, formerly factory manager, Ferro Machine & Foundry Co., Cleveland, has been elected second vice president of the firm. He was born at Massillon, O., on May 18, 1881 and after leaving high school learned the machinist trade at the Diamond Match Co., Barberton, O. In 1911 Mr. Myers became associated with the Ferro Machine & Foundry Co. as an inspector, and in 1915 was made superintendent of the machine shop. For 6 years previous to his present advance, Mr. Myers was factory manager.

♦ ♦ ♦

HENRY M. LANE, Detroit, for many years a consultant in the foundry field, recently was made foundry research engineer, Paul Maehler Co., 2200 West Lake street, Chicago.

♦ ♦ ♦

HENRY S. MINSTER recently was elected president, Roberts & Mander Stove Co., Hatboro, Pa., succeeding Clarence V. Roberts, who now is chairman of the board. Mr. Minster has been a partner in Minster & Co., consultants in management and marketing problems.

♦ ♦ ♦

FRED L. WOLF, technical director, Ohio Brass Co., Mansfield, O., was elected chairman of A. S. T. M. committee A-7 on malleable iron at the recent annual meeting at Atlantic City, N. J., succeeding EDWIN K. SMITH, metallurgist, Electro Metallurgical Co., Detroit. JEROME J. KANTER, research metallurgist, Crane Co., Chicago, was made vice president, succeeding Mr. Wolf, and HARRY A. SCHWARTZ, manager of research, National Malleable & Steel Castings Co., Cleveland, was re-elected secretary.

♦ ♦ ♦

FRANK J. STANLEY, formerly superintendent, Crucible Steel Casting Co., Cleveland, has been made foundry superintendent, Lebanon Steel Foundry, Lebanon, Pa. Mr. Stanley served his apprenticeship with the Commonwealth Steel Casting Co., Granite City, Ill., and has been identified prominently with the steel foundry field. For 8 years he was associated with the Michigan Steel Casting Co., Detroit, where he ultimately became general manager. Prior to his connection with the Crucible Steel Casting Co., Mr. Stanley was general superintendent, Locomotive Finished Material Co., Atchison, Kans.

♦ ♦ ♦

JOHN W. BOLTON, chief chemist and metallurgist, Lunkenheimer Co., Cincinnati, was elected chairman of A. S. T. M. committee A-3 on cast iron at the Atlantic City, N. J. meeting of that society, succeeding WILLARD H. ROTHER, metallurgist, Buffalo Foundry & Machine Co., Buffalo. JAMES T. MACKENZIE, chief chemist, American Cast Iron Pipe Co., Birmingham, Ala., was named vice president succeeding ROBERT JOB MELTON, vice president, Hersey Co., Montreal, Que., and EDWARD R. YOUNG, metallurgical engineer, Climax Molybdenum Co., Chicago, was elected secretary, succeeding HERMAN C. AUFDERHAAR, metallurgist, Electro Metallurgical Co., Chicago.

♦ ♦ ♦

C. O. BARTLETT recently was made district manager at Detroit of the C. O. Bartlett & Snow Co., Cleveland. Mr. Bartlett, son of the founder and organizer of the company, was graduated from Case School of Applied Science in 1916 and immediately following held positions in the company's engineering and erection departments. He served with the U. S. air corps during the war and returned to the Bartlett & Snow company for a time. Recently he has been associated with the American Agricultural Chemical Co. as manager of its gelatin division in Detroit. Mr. Bartlett has been a director of the C. O. Bartlett & Snow Co. for the past 20 years.

♦ ♦ ♦

HARRY K. CLARK has been elected vice president and general manager, and ANDREW B. HOLMSTROM has been made vice president and works manager, Norton Co., Worcester, Mass. These appointments have been made to fill vacancies caused by the resignations of ALDUS C. HIGGINS, president and general manager as general manager, and GEORGE N. JEPPSON, treasurer, vice president and works manager as works manager.

Mr. Clark has been with the company 25 years, having held the positions of salesman; Chicago district manager, sales manager of the company's plant in Germany; sales manager abrasive division; general sales manager, a director and vice president. He is also executive officer in charge of Norton Co. of Canada Ltd., a director, Behr-Manning Corp., Troy, N. Y., and Australian Abrasives (Pty.) Ltd., Sydney, Australia.

Mr. Holmstrom, in his 20 years' association with the company, has had considerable experience as an engineer and in plant management. After 5 years in the Norton plant's engineering department, he became superintendent of sewers for the city of Worcester when the city was installing its sewage purification plant. After its completion he returned to Norton. Mr. Holmstrom spent some time in England, first as resident engineer and later as general manager of the company's British plant. He returned to America in 1929 to become works manager, abrasive division.

(*Concluded on page 46*)

Frank J. Stanley

Andrew B. Holmstrom

C. O. Bartlett

Harry K. Clark

Improve Your Skin-Dried Mold Facings With TRULINE BINDER

T. M. Reg. U. S. Pat. Off.

You can improve your skin-dried mold-facings with Truline Binder. Foundries in every important metal-casting center are turning to this efficient, economical binder for results they can't get with other materials.

Truline Binder does a better job — gives a better finish — saves money. The mix is freer-flowing — which means easier ramming — and it develops a better bond under the torch. Migration of moisture back to the dried surface is retarded. Thus the use of Truline Binder in mold facings results in sound, smooth castings that are true to pattern.

This same material is also used as a core binder, and in green-sand facings and core washes.

Here's a binder that you should investigate — a uniform product that bonds better — is easy to use — costs very little. A trial amount will convince you that you should be using it regularly.

Tear out and mail TODAY

Naval Stores Department

HERCULES POWDER COMPANY

Incorporated

999 Market Street Wilmington, Delaware

Gentlemen: What can your Truline Binder do for me? I am interested in using it as checked.

- ☐ As a mold-facing binder.
- ☐ As a core binder.
- ☐ In core-washes.
- ☐ Please send me a 5-lb. sample so I can try it out.

Name _____ Position _____

Company _____

Address _____

JJ-33

(*Concluded from page* 44)

HENRY WING recently was appointed foundry foreman for the Charter Oak Stove & Range Co., St. Louis.

♦ ♦ ♦

IVAN L. JOHNSON, president, Pacific Steel Casting Co., Berkeley, Calif., recently was elected chairman, Northern California Chapter of the A.F.A. Mr. Johnson was born in 1895 in the area which is now Oakland, Calif. His first position with the steel industry was with the Holt Mfg. Co., San Leandro, Calif., where he remained for 3 years. Successive positions were with the C. L. Best Gas Traction

Ivan L. Johnson

Co., Best Steel Castings, which was later taken over by the General Metals Corp., and with which company he continued for several years as works manager. In 1935 he joined the Pacific Steel Casting Co., and soon after was elected president of that concern. Mr. Johnson has been active in association work and has played a prominent part in the work of the Northern California Chapter of the A.F.A. He is a past chairman of the American Society for Metals, director of the Steel Founders' Society of America, vice president of the Berkeley Manufacturers' association and one of the organizers and a director of the North California Foundrymen's institute.

♦ ♦ ♦

A. E. FORSTER has been appointed assistant general manager, naval stores department, Hercules Powder Co., Wilmington, Del.

♦ ♦ ♦

G. B. FLANIGAN recently has been appointed New York district manager, Chain Belt Co., Milwaukee, to succeed the late W. H. Quinn. Mr. Flanigan entered the employ of the company immediately after graduation from the Sheffield Scientific school, Yale university in 1925. For several years he was located at Milwaukee, in both manufacturing and sales departments, and in 1928 became a member of the New York district sales force. In 1937 he was appointed Chicago district sales manager.

♦ ♦ ♦

DR. LINCOLN T. WORK, associate professor of chemical engineering, Columbia university, New York, has been appointed director of research, Metal & Thermit Corp., New York.

♦ ♦ ♦

LEN BARTEN, Maynard Electric Steel Casting Co., Milwaukee, recently was elected director of the Industrial Relations Association of Wisconsin, at its annual meeting held in Milwaukee.

♦ ♦ ♦

C. C. DEWITT, head of the chemical engineering department, Michigan College of Mining and Technology, Houghton, has been appointed to a similar position at Michigan State college, East Lansing.

♦ ♦ ♦

R. T. STEINDORF has been appointed district manager of the Chicago office, Chain Belt Co., Milwaukee. After graduation from Purdue university in 1924, Mr. Steindorf joined the Chain Belt Co. as an apprentice. Since that time he has worked in both the engineering and sales departments of the company.

♦ ♦ ♦

CARL M. AHLGREN, Cedar Rapids, Ia., recently retired after spending 57 years as a molder in various foundries. He learned the trade in Lund, Sweden, and afterward worked in other cities in Sweden, Norway and Denmark. He came to the United States as a young man and worked at West Allis, Wis., Braddock, Pa., and at the navy yard in Philadelphia. In 1897 he settled in Cedar Rapids.

♦ ♦ ♦

DELBERT E. JACK has been appointed general sales manager, Duriron Co. Inc., Dayton, O., succeeding W. H. SCOTT, retired. Since graduation from the University of Colorado in 1923, Mr. Jack has been identified with the design and application of chemical plant equipment, and formerly handled Duriron Co. sales in the San Francisco area.

♦ ♦ ♦

DR. ETTORE PERETTI recently was appointed assistant professor of metallurgy, school of mines, Columbia university, New York, to take over the instruction in nonferrous metallurgy formerly given by DR. EDWARD F. KERN, who has retired. Dr. Peretti has been teaching metallurgy in the Montana schools of mines since 1936. He took his bachelor of science and master of science degrees in metallurgy there, and then went to Hamburg and Stuttgart under a fellowship from the International Institute of Education. He received the degree of doctor of sciences, magna cum laude, from Stuttgart in 1936.

♦ ♦ ♦

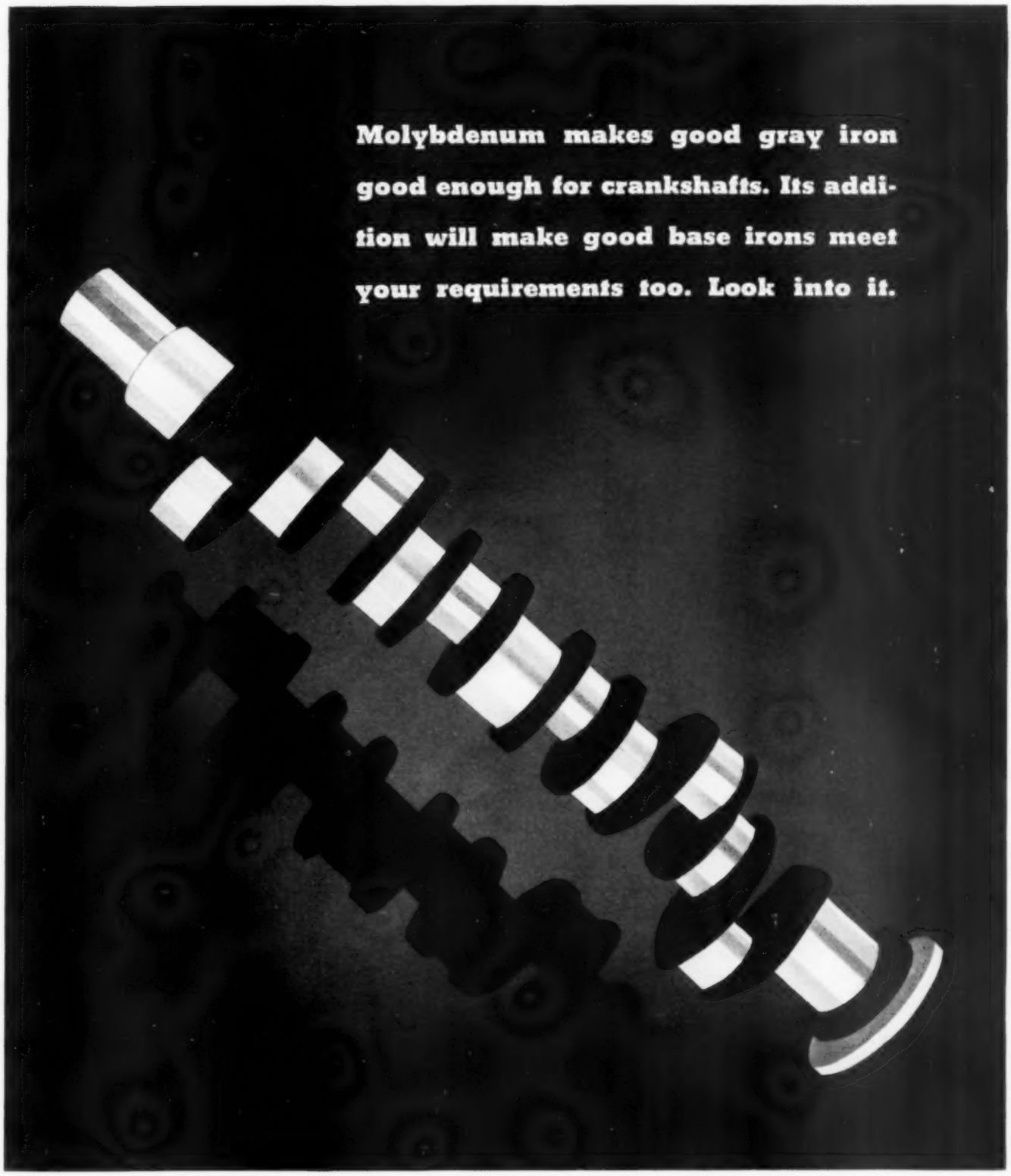
J. EUGENE JACKSON, for the past 8 years associated with the Chase Brass & Copper Co., Cleveland, as assistant process metallurgist, has been appointed metallurgical engineer, Copper Iron & Steel Development association. Cleveland. Mr.

J. Eugene Jackson

Jackson, who attended the University of Texas, will direct the research, development and service activities of the association.

♦ ♦ ♦

DAVID BLACK, for the past 37 years factory superintendent, Estate Stove Co., Hamilton, O., retired recently. His place is taken by Harry Dolf who has been assistant superintendent. Mr. Black was born in Scotland in 1865 and emigrated to Canada at an early age where he learned the trade of iron molding. Later his ability to think clearly and express his opinions in the oral and written form earned him a place on the editorial staff of the *Iron Molders Journal*. As editor of that publication for several years he became widely known in the foundry industry. In 1903 Lazard Kahn one of the founders of the Estate Stove Co. secured the services of David Black as factory superintendent. A remarkable man in many ways his expert knowledge of metals and shop practice and his ability in handling all relations between company and employes earned for him the regard and affection of company officials and employes.


Molybdenum makes good gray iron good enough for crankshafts. Its addition will make good base irons meet your requirements too. Look into it.

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

FOUNDRY DEVELOPMENTS AT SHORT RANGE

INDUSTRIAL version of the old saying, 'It isn't the heat but the humidity that makes one uncomfortable' becomes—It isn't the heat, it's the salt loss that does the damage among workers doing hot, heavy work! Since the body does not store a reserve supply of salt, it is necessary to replenish that lost through sweating at suitable intervals. One of the simplest methods is taking 10-grain salt tablets which are located in suitable dispensers mounted by drinking fountains. Amount of salt to be taken by the worker will depend on the type of work, and the following schedule is recommended: Light to medium work—5 to 6 tablets a day; medium to heavy work—8 to 10 tablets a day, and extra heavy, hot work—12 to 15 tablets a day.

* * *

Molding sand for gray iron castings when tempered on the heavy side, decreases fluidity to a large degree, and also increases the chilling tendency. Hence, it is advisable to hold the moisture content of the sand just below the temper point.

* * *

An extensive investigation of composite structures wherein steel castings are welded to wrought steels indicates that with good welding practice, sound high-strength welds can be made with cast steels containing up to 0.35 per cent carbon.

* * *

An eastern firm has developed a chemical treatment which is said to provide protection for aluminum and its alloys against certain types of corrosion, abrasion and oxidation. Numerous advantages are claimed for the process which does not involve use of electric current, in that the material used is mixed with water and easy to use; time is not critical; degreasing and cleaning can be dispensed with; solution is nontoxic; surface left by treatment is hard, practically colorless, and is an excellent base for paints, lacquers, etc.

* * *

What difficulty is experienced in higher silicon content in the first part of a cupola heat as compared with later taps, it may be advisable to place limestone in the bed coke. That is to say at some time before the full height has been reached. That arrangement forms slag early, and removes any silica which m ght be picked up by the iron.

* * *

It is claimed that an easy and rapid method to determine whether bronzes and brasses have been gassed during melting is to make a small test sprue in one corner of the mold with a 1½-inch sprue cutter. Fill the cavity to within ½-inch of the top, and observe carefully the way the metal sets. If a good shrink sets in, the metal is satisfactory while if the test piece bulges on the top it is gassed. Strings forming on pouring lip of the crucible, and black specks rising to the surface of the molten bath indicate that the metal is oxidized highly.

* * *

RECENT development of hardening operations on high carbon steels wherein the material is quenched in a liquid bath maintained at a definite temperature, and which is termed, "austempering," has been proposed for application to pearlitic malleable iron. Bars of hard iron annealed sufficiently to complete the first stage of the usual cycle were quenched in a bath of molten lead for 1 hour at 1000 degrees Fahr. showed a hardness of 40 rockwell C. Quenched in a lead bath at 650 degrees Fahr., the bars showed a hardness of 49 rockwell C. That type of heat treatment provides a hardened structure confined to the surface areas of heavy pieces while the remainder is toughened strongly.

* * *

IF LARGE quantities of dirty scrap or borings are used as raw materials for bronze and brass, a flux of the glass type will prove useful in collecting the drosses. A mixture of 50 per cent glass and 50 per cent borax works quite well for that purpose. Care must be taken not to use a flux which will attack the crucible as it may result in the alloy picking up undesirable impurities, or reduce materially the crucible life.

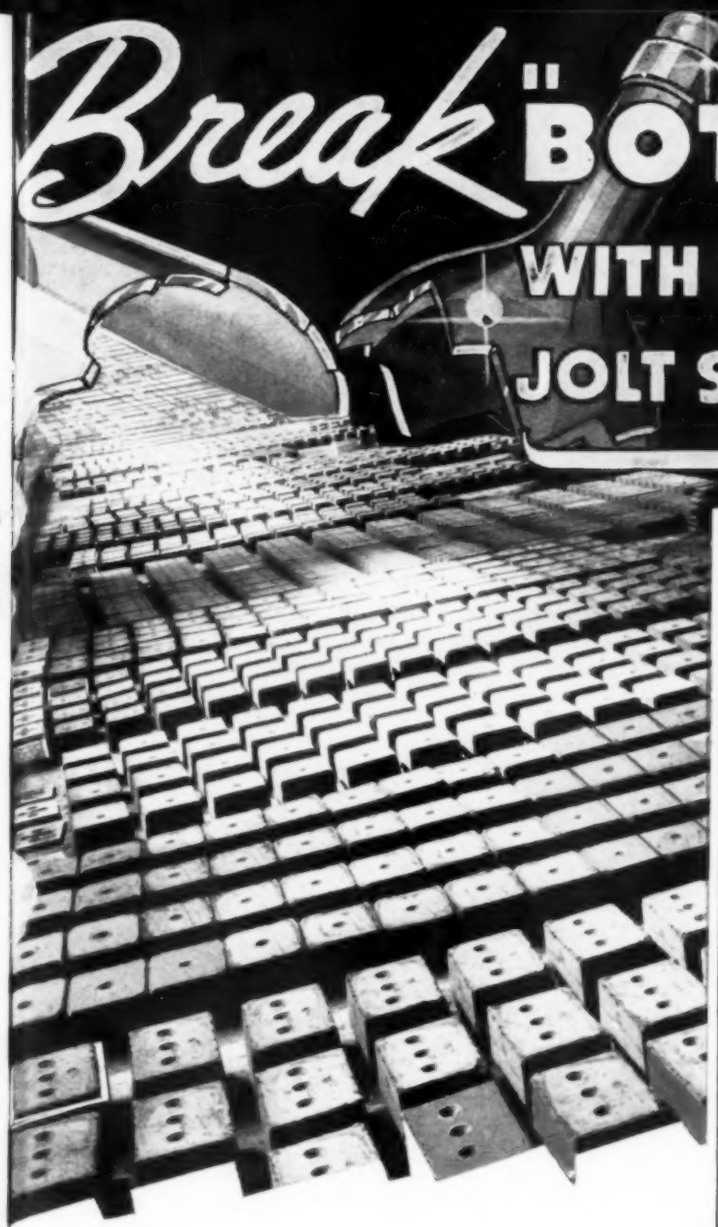
* * *

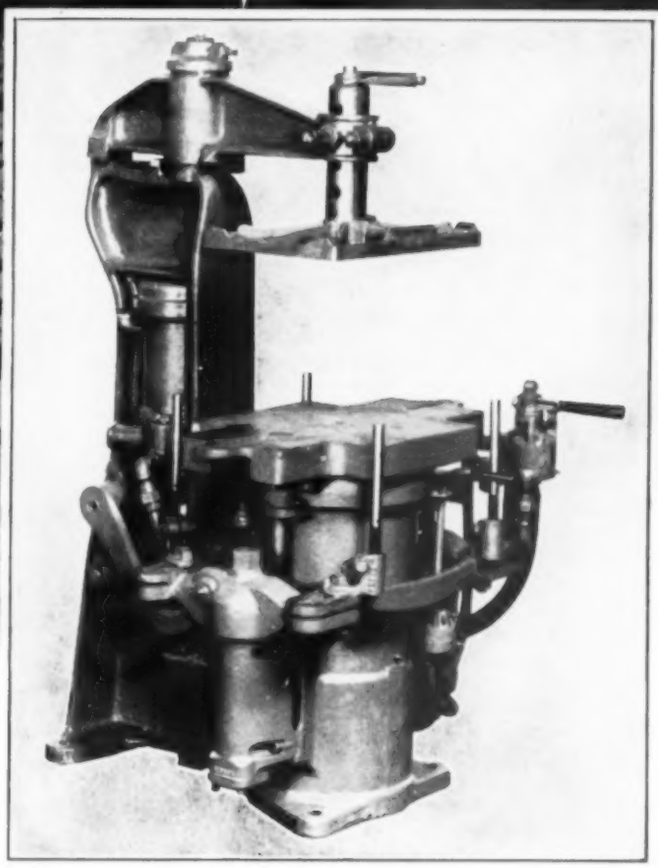
Careful check should be maintained on the size of the nozzle used in blast cleaning of castings to keep the costs within bounds. For example, it is claimed that a 7/16-inch bore nozzle will use 205 cubic feet of free air per minute at 60 pounds per square inch pressure while if the jet wears to ½-inch in diameter, 270 cubic feet of air are required—an increase of over 30 per cent.

* * *

Specific heat and latent heat of fusion of metals and alloys, usually regarded as only of academic interest by most foundrymen, have practical interest and importance in melting and cooling in the mold. That is shown with exceptional clarity in some figures obtained in an English foundry with a 650-pound, oil-fired tilting furnace where oil consumption showed that almost exactly the same quantity of oil was used to melt 200 pounds of aluminum alloy pouring at 1202 degrees Fahr. as to melt 650 pounds of admiralty gunmetal pouring at 2102 degrees Fahr. That of course, is due to the high specific heat and latent heat of fusion of aluminum and its alloys.

Break "BOTTLENECKS" WITH THIS NEW OSBORN JOLT SQUEEZE STRIPPER





Engineered for Fast, Economical Production of High Quality Moulds...

"Bottlenecks" in moulding production need not occur when demand for speed conflicts with demand for accuracy. • The new Osborn Jolt Squeeze Stripper illustrated is both fast and accurate. The following models are quickly adaptable to a wide scope of flask sizes in their respective size range:

MACHINE NUMBER	*710 PJ*	*712 PJ*
Table Size	16" x 25"	17" x 27"
Squeeze Cylinder Draw	10"	12"
Lifting Pins adjustable front to rear	10" to 19"	11" to 20"
Lifting Pins adjustable left to right	14" to 26"	16" to 28"

Investigate the new *oil draw operation* and other advanced features of these new Osborn Jolt Squeeze Strippers. Osborn sales-engineers will explain all advantages as applied to YOUR operations. *Call OSBORN for cooperation!*

THE OSBORN MANUFACTURING COMPANY

401 HAMILTON AVENUE — *Agencies located strategically all over the world* — CLEVELAND, OHIO, U.S.A.

OSBORN

MOULDING MACHINES

THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

STROLLING around the amphitheater admiring the almost infinite display of equipment and supplies staged at the recent annual meeting of the A.F.A. in Chicago, Bill and I ran into a great number of men known to us over varying periods of years. Some of these men we meet frequently, while others we meet only at the annual gathering of the clans. In many instances Bill recognizes men with whom he worked in early youth, harum scarum young cubs with a hat on three hairs of their heads, now gray haired and dignified and holding responsible positions in the foundry industry. At the meeting the years roll away and the old boys forget the paunches, the jowls, the bags under the eyes and the almost invisible scalp lock and they laugh over every incident dredged up from a forgotten past in a manner to persuade a young or middle age bystander that there are not now, and never will be again, any days like the good old days when they were young and tough and strong, full of boiling steam and vinegar and ready at a moment's notice to engage in a fight or a frolic. Work? That was only incidental.

If it was not for the well known and undoubted veracity of all men with a foundry training some of the tall tales would strain the credulity of at least two strong men accustomed to the exploits of Baron Munchauson. Was it not Mark Twain who touched on a well known human frailty when he declared that the older he grew the better he could remember things that never happened? Over a period of years names and dates in the average man's mind are about as legible as those on a moss covered tombstone. That does not prevent him from quoting freely when occasion offers. One man remembered distinctly a certain episode in which he and I figured in a Mid-west city about 1917 or 1918. He was not quite sure of the exact year but it was shortly before this country dealt itself a hand in the great war game across the water. His memory was correct in every particular except the date, which I have certain reason for knowing was 1921, three years after Uncle Samuel pulled out of the game with nothing but a handful of I.O.Us which he never has been able to collect. Now, twenty years later he is doing a bit of tentative hovering around the table again. Cheerful prospect for parents with boys of military age.

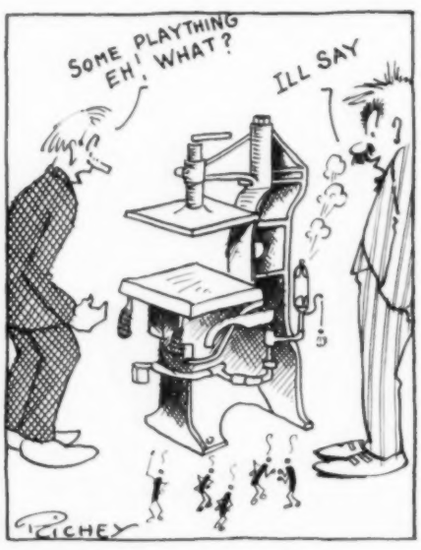
Chance reference to the iron statue of Vulcan overlooking Birmingham from a pedestal on Red Mountain brought a detailed history from Bill McMahon. Bill modestly admitted that the job was cast before his time, but claimed it was just another monument to the enduring quality of the pig iron made by his company. Max Kuniansky, from Lynchburg, Suh. in the Old Dominion, gave a spirited, highly technical and scholarly description of the methods employed in producing cast iron ducks for garden ornaments. Considerable trouble was experienced before an ingenious method of venting the cores was developed.

Reference to cores reminded Bill that some time ago he had an interesting exchange of correspondence with a foundryman who wrote that he had an order for two boring machine tables 6 x 12 feet, with boxed top and seven longitudinal bolt slots in the plate which was to finish 4 1/4-inch thick. He wanted to know if any special precautions were necessary in molding and casting these tables to prevent them from warping or twisting. Also if any special sand mixtures were required for the T-slot cores, "I wrote him," said Bill "as follows":

Where the mold is made properly by skilled men and where it is weighted down, clamped or bound together in a manner to prevent it from straining, especially in the center, the casting made from a straight pattern will not warp or twist. Cope, weights or binding bars are not disturbed for at least 48 hours after the casting has been poured. Slight variation in technique will depend on whether you use a full or partial pattern, or a frame and sweeps; also on whether the mold is made in a flask or in a pit in the floor. If made in a flask, the bottom plate should rest on a solid foundation. What perhaps is more important, the drag should not be rolled over, or lifted later to the drying oven car. Either of these moves easily might twist the mold and produce a twisted casting. The drag might be made in green sand, but a good skin drying supplies an insurance feature and imparts a nice smooth, clean skin to the casting.

Assuming that you have a full size pattern, the following brief outline covers the principal or essential features where the mold is made either in a flask or in the floor. A flat coke bed is put down and covered with a 6-inch course of black sand, tramped and butted down lightly, vented all over and then covered with a 1 1/2-inch thickness of facing sand, half and half new and old sand with a shovel of sea coal to every 8 shovels of sand and a shovel of cereal binder to every 12 shovels of sand. The bed is leveled off with one transverse and two longitudinal straight edges and the pattern is set in place and tapped down lightly. The pattern is lifted and the sand is removed in long, narrow channels to accommodate

(*Continued on page 52*)



Experts appraise new features

Mechanical *Cupola Charging*

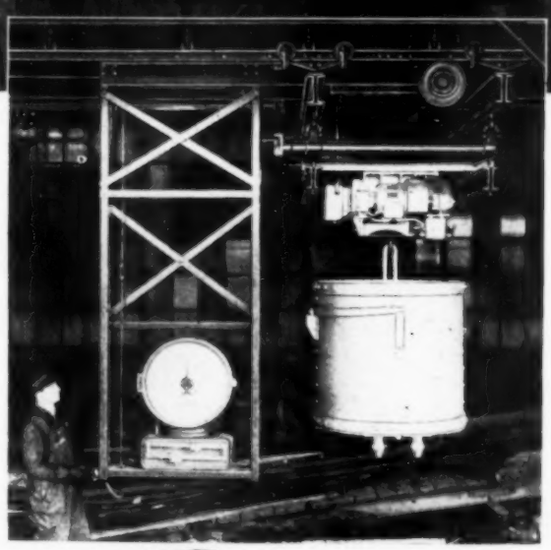
ABOVE—Traveling scale carrier delivers accurate charge to cupola at half the former cost.

●

CENTER—Cupola charger lowers bottom-dump bucket to deposit material in uniform layers.

●

LOWER—Traveling crane type carrier assures accurate weight and careful handling of charge.



Scientific foundry practice demands control of all materials in the charge. And profits are determined by the cost of handling these materials. Both can be obtained today by mechanical charging.

With scale units controlling the weight of materials on the carrier, half the handling labor can be turned to more productive use. Buckets arrive at the charger in faster intervals for careful lowering and uniform changing to insure equal distribution of heat.

Reports indicate that such methods result in greater plant capacity without further expansion; improved practice throughout the foundry; lower costs with increased opportunity for profits.

Consultation with engineers who have pioneered in the development of handling equipment may reveal such possibilities in your plant. Their assistance is offered without obligation.

SEND FOR THIS BOOK
254 page catalog sent on letterhead request.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND, OHIO

ADVERTISING PAGES REMOVED

(*Continued from page* 50)

the core prints. A rough indication is all that is necessary, since all mending up and tucking is done later when the slot cores are in place. The pattern then is returned to place and the remainder of the mold is rammed in the usual manner.

Several types of core sand mixtures will serve satisfactorily and leave clean slots in the casting. One that is favored by many men is a 40 to 1 oil sand mixture, all sharp sand with a shovelful of blacking or plumbago to each 10 shovels of sand. After the cores are dried they are coated with thick blacking, or preferably silica wash. For this job the cores can be made in sections approximately 2 feet in length. The head ends touch, but a gap about an inch wide is left between the webs of each pair to provide a passage for the first iron to enter the mold. The little blocks of iron are removed in the chipping operation. With this arrangement three or four gates at each end will deliver the iron to the mold in a satisfactory manner.

In an alternative method the metal from two sprues enters a long runner formed in cores outside the end of the mold, and then enters the lower part of the mold through eight gates, one for each space between the *T*-slot cores. The slot cores are made in a corebox in which three spikes are erected to form three holes on a slant from the perpendicular. When the dried cores are placed in the mold, spikes are driven through these holes part way and into the sand underneath to anchor the cores in place. Theoretically the broad base of the core print should prevent the core from floating, but accidents occasionally upset the best theories. The spikes provide the necessary assurance that the cores will stay in their places.

The body cores that form the cope side of the casting are placed on blocks of wood in the drag. The cope then is set in place and hook bolts are dropped through suitable openings to engage hooks in the cores. After the nuts are tightened, the cope with suspended cores is removed temporarily until the wood blocks are lifted out of the drag. With the cope face extending 7 inches below the joint, and with a minimum height of 12 inches under the flow-off riser, the lift on the cope will amount to approximately 30 tons. Whether the weights are piled on an extra large cope, or piled on steel beams or cast iron binders on a smaller cope, precaution should be taken to see that the center of the cope is wedged down rigidly.

"I thought," said Bill, "that I had covered all the details but a few days later I had a wire: 'Please give size and location of feeding heads if necessary.' To this I replied 'One 6-inch riser reduced to 3 x 6 inches top of short center rib. Two 6-inch side risers each end. Four 6-inch risers each side. Set 6 inches back from pattern and provide horizontal opening 4 x 6 inches into casting near bottom. Rod and vent sand between risers and casting. Carry risers at least 12 inches above casting.'

"Shortly afterward my correspondent wrote again: 'I had intended skin drying the mold in the oven, but after reading your letter I have decided to make it all core sand. I cannot dry a mold on the floor. I am going to make two large cake cores for the bottom with prints in them for the *T*-cores. These *T*-cores will be anchored with wires in the bottom cores, set in an iron flask on a level bed and supported on a cast iron bottom plate. Binder bars under the bottom and over the cope, held together with stout bolts will prevent the mold from straining. With only one crane I cannot gate the mold at both ends. Gated through a core as you suggest I think the metal will run from one end. Another way would be to drop gate across the center of the cope through six or seven gates located above the spaces between the *T*-cores. Small pieces of steel plate on the face of the drag would prevent the metal from cutting under the gates.'

"I wrote him that the main objection to pouring the casting from one end is that the metal will cool to some extent on the long journey to the opposite end and may settle into a rounded instead of a sharp corner under the head of the bolt cores. A minor objection is that where the entire volume of metal enters at or near one place, the sand in the vicinity may cut or wash. My suggestion to pour the casting at both ends was designed to remove both these hazards. I was not aware of crane and ladle limitations.

"Present plan to pour the casting through pop gates is excellent. Two rows of 1-inch diameter gates all across the center and about 3 feet apart will deliver the metal to the mold in a satisfactory manner. Even with the binder bars in position a suitable runner basin may be built. Theoretically the best method of gating a casting of this kind is through a series of small pop gates spaced on 12-inch centers. This method not only insures clean metal, but it produces even temperatures all over the casting, a fairly important factor in subsequent shrinkage and contraction. Incidentally with the metal entering the mold through a multiplicity of small gates the wear on the sand at any given point is not excessive. However, in this instance, a double row of gates about 3 feet apart will serve as a satisfactory compromise.

"The dry sand cores will make a nice bottom on the mold. Presumably they are long enough and wide enough to be anchored under the

(*Concluded on page* 88)

The old boys live over again the days when they were young and tough and a job was only incidental

DETROIT AMONG FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

NATIONAL defense program continues to hold the industrial spotlight in the Detroit area, although up to the middle of July only a feeble trickle of actual business had been placed for production. However, foundrymen throughout Michigan are taking stock of their plants, many of them rushing through improvements even without any definite orders.

Government experts have surveyed most foundry production facilities in the district and in some cases have recommended installation of additional equipment to handle orders which practically are certain to come when they have cleared official channels in Washington.

Prepare for Orders

In anticipation of government orders, Wilson Foundry & Machine Co., Pontiac, Mich., is spending around $200,000 on its plant, consolidating operations more centrally, refurbishing offices, relocating machine shop, laboratory and shipping and receiving facilities. Wallace O. Leonard, assistant to the president of Wilson, says, "We have received no definite orders as yet, but we will be ready if any come." Pointing out that the modernization program would be completed by Sept. 1, he also noted that in recent weeks the plant has been inspected by government agents.

One of the main phases of the defense program, as far as Detroit is concerned, has been the contract for manufacture of 9000 Rolls-Royce Merlin aircraft engines. At first apparently all set to go in the Ford plant, the project received a sharp setback when Mr. Ford declined to supply engines to the British government. Nevertheless a corps of some 300 engineers continued their work in the Ford Rouge plant in perfecting details of the engine for manufacture. Representatives of the Rolls-Royce organization made their headquarters at the plant and up to July 17 were still there.

Packard Motor Car Co. now seems destined to undertake manufacture of the engines. Preliminary steps have been taken at the Packard plant to initiate a tooling program which will require 10 months. Should the plan go through, Packard will be assembling 20 engines a month starting next May, and by September, 1941, will be turning out 840 a month. On this basis, the contract for 9000 engines would not be filled until July, 1942. Just how urgent the need for 9000 aircraft engines, 1200 horsepower each and costing around $14,500 apiece, will be by that time is a matter of conjecture.

In the opinion of aircraft experts, the Merlin engine is rated as the last word among liquid-cooled high-horsepower jobs. It is a V-12, with 5.4-inch bore and 6-inch stroke. Crankcase is of the split type, the upper part carrying cylinders, crankshaft bearings and part of the propeller reduction gear. The lower part in reality is an oil pan. Both are considered remarkable examples of aluminum casting, using British R. R. 50 aluminum alloy, heat treated after machining. Cylinder blocks are one-piece aluminum castings set at an angle of 60 degrees to one another. Main bearings are split mild steel shells lined with a special lead-bronze alloy by a secret British casting method.

Alloy Metals in Engine

Six wet cylinder liners of high-carbon steel are inserted in each cylinder block. The term wet signifies the liners are in contact with the engine coolant, in this case the ethylene glycol type of liquid. Each cylinder has four valves, operated through an overhead camshaft and rocker arms. Valve seat inserts are aluminum bronze for inlets and silchrome for exhaust, screwed into the cylinder heads which also house valve guides, cast iron for inlets and phosphor bronze for exhaust. Pistons are aluminum alloy forgings. Crankshaft, camshaft, connecting rods, wristpins and other highly stressed parts are alloy steel forgings. Ford is reported to have re-designed the crankshaft for cast steel, saving better than 100 pounds in weight.

The engine, with supercharger, develops about 1200 horsepower, has dry weight of 1335 pounds, and frontal area of only 5.85 square feet, making it ideal for installation in high-speed fighters and pursuit ships.

Another phase of the defense program of particular interest to foundrymen is the manufacture of shells. Several Michigan companies are actively investigating techniques of casting shells in calibers ranging from about 3-inch to 14-inch. Such shells were cast in large numbers during the last World war, but naturally there has been considerable progress in casting skill in the intervening 23 years. Some government experts seem to forget this fact. They still are inclined to question the soundness of producing shells by casting. Lack of uniformity in iron quality was troublesome two decades ago. Fragmentation characteristics varied and strengths were low.

Foundry Has Selling Job

Today the modern foundryman can control his iron quality to a gnat's eyelash, can add carefully measured amounts of alloying elements to build up strengths and can easily turn out repetitive castings alike as peas in a pod. There is a selling job to be done by the foundry industry to arsenal experts, and it is being tackled assiduously at the moment.

Along the motor fronts, the pilot cars are coming down assembly lines and the few remaining bugs in them given a dose of engineering flit. Last-minute rush to buy 1940 models in most cases meant little carryover by dealers into the new production season. In fact, some plants wish now they had been able to keep going a week or two more to satisfy a spiraling demand for 1940's.

It is a safe bet that prices will be higher on the new merchandise, that changes, both mechanically and appearance-wise, will not be radical, that new car buying may languish somewhat this fall because of an oversold condition earlier in the year.

One new model, which at this

(*Concluded on page* 58)

After 5 years of actual use, the news comes out

because AJAX *Vibrating* CONVEYORS HAVE SOMETHING NO OTHERS HAVE!

TODAY hardboiled Foundrymen know that the surest and practically the ONLY way to cut costs is by savings in handling materials. Whether you have to move raw sand, used sand or castings, you can now eliminate bottle-necks by using AJAX *Vibrating* CONVEYORS.

AJAX CONVEYORS are being used wherever materials have to be moved from here to there. Foundrymen are using them on the mean jobs where other types of conveyors do not fit . . . for short and for long hauls . . . for fixed and variable rates of flow . . . outdoors and indoors.

Installation may be at floor level, below the floor or overhead; on the level, up-hill or down-hill. AJAX CONVEYORS are self-contained, delivered ready to run.

AJAX VIBRATING CONVEYORS

Eliminate slow costly shoveling and wheelbarrow methods

no belts	no head pulley	no idlers
no chains	no tail pulley	no eccentrics
no rollers		no grease

Low first cost, lower operating cost, lowest maintenance cost!

AJAX

AJAX FLEXIBLE COUPLING CO., WESTFIELD, N. Y.

READ THESE QUESTIONS AND ANSWERS

Q. Have Ajax Conveyors been used in foundries?

A. Yes—they have been used in leading foundries for five years . . . repeat orders prove their success.

Q. Is their design perfected?

A. Absolutely! Simplicity of principle combined with rugged construction has eliminated all "bugs".

Q. Will Ajax Conveyors stand the gaff?

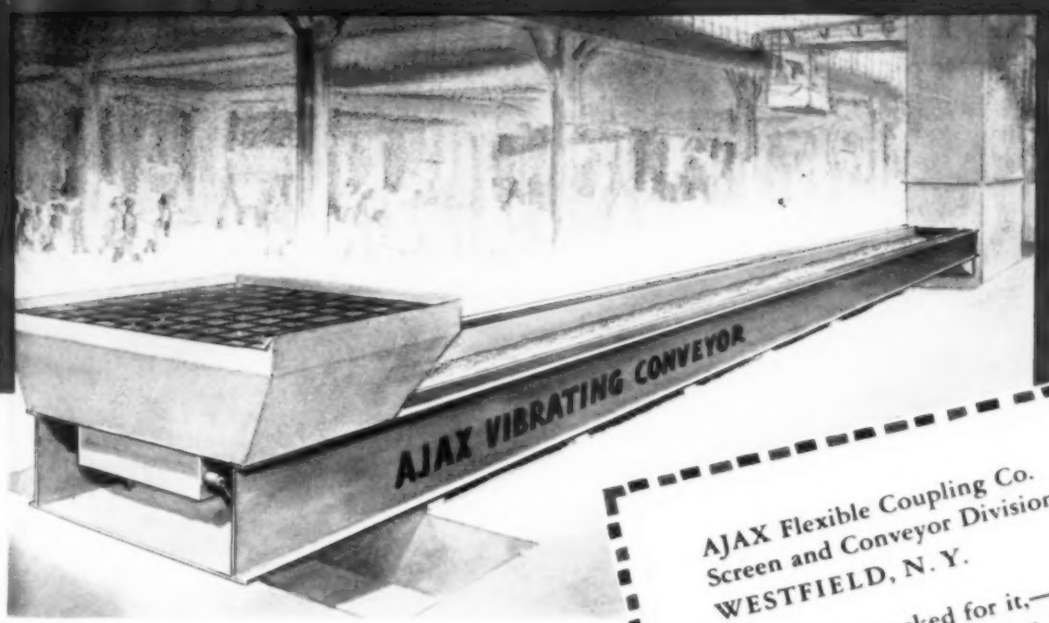
A. Steel construction throughout makes them stand up to hard service in handling sand, core irons, gaggers, shot, spill and castings, both hot and cold.

Q. How do Ajax Conveyors cut maintenance costs?

A. The Ajax patented drive unit is completely enclosed and runs in oil on ball bearings; requires less attention than the motor that drives it.

Q. Are they difficult to install?

A. No! All the engineering is done for you... practically a conveyor in a package, ready to set in place.



Typical schematic drawing showing one of many labor and money saving applications... you can move material at lowest cost per ton with Ajax Vibrating Conveyors.

FILL IN THIS COUPON *right now*

AJAX Flexible Coupling Co.
Screen and Conveyor Division
WESTFIELD, N. Y.

All right, you asked for it,—tell me how I can cut my handling costs under the following conditions.

★ Kind of Material _____

★ Tonnage per hour _____

★ Distance in feet _____

★ Level, ☐ up ☐, down grade ☐

★ Degree of slope _____

Name _____

Company _____

Street _____

City _____

SCREEN AND CONVEYOR DIVISION

(*Concluded from page* 55)

juncture seems almost certain to reach dealers' floors in September, is the Ford six-cylinder car. So many times has a Ford six been reported on the way only to be suspended later, that one hesitates to bring the subject up again. However, on the best authority, it is stated that some 10 engines a day are now being turned out at the Rouge plant and that schedules call for 600 a day by the end of August. Designated the *IG* engine, it is not the same design formerly given preliminary tests. In fact, there have been a flock of Ford experimental sixes going through the Rouge plant for several years, two of the most recent being the *OHV* and *OMA* designs. Ford foundrymen consider it a routine matter when a six block comes through. They have seen so many of them already.

Production of 600 per day certainly is far beyond the experimental limit, so this time it seems that a six will be included in the 1941 model array. Reports also are heard that the engine will be placed in a completely new type of chassis and body, that the 60 and 85 V-8 models may continue in their present categories for some time yet.

Ford production of 1940 models was scheduled to come to a stop on July 19, and went 15,000 units past the original final budget. So close is the 1941 program on the heels of the 1940 production, that little suspension of activity is anticipated in the Ford plant because of model changeovers.

Unusual type of blast cleaning unit has been installed in the Ford foundry for handling cylinder blocks directly from the shakeout. Completely automatic and conveyorized, it extends into the uppermost reaches of the foundry building and turns out cleaned blocks at a rate of ten a minute.

Book Review

The Structure of Metals and Alloys, by William Hume-Rothery, cloth, 120 pages, 5½ x 8½ inches, distributed by Chemical Publishing Co. Inc., New York, $1.75.

Continual increase in published work relating to crystal structure of metals and alloys has coincided with great improvement in experimental methods for determining equilibrium diagrams, and with revolutionary changes in modern physical theory of electrons and atomic structure. Hence, some of the fundamental principles underlying alloy structures are becoming clear, and if those principles can be appreciated, the possibilities of their practical application are considerable.

Aim of the author is to throw light on the fundamental principles by selection of certain subjects rather than by a complete summary, and to that end the book is divided into six parts. The first describes the electronic background to metallurgy while the second is concerned with the crystal structure of the elements. Third part relates to the atomic radii of elements and the fourth discusses primary metallic solid solutions. Fifth and sixth parts deal with intermediate phases in alloy systems, and with imperfections in crystals and deviations from the ideal lattice.

Factory Design

"Lowering Costs through Better Factory Design" is covered in a pamphlet recently published by the American Management association, 330 West Forty-second street, New York. Articles included are by Raymond S. Perry, Ingersoll Milling Machine Co.; Albert Khan, Albert Khan, Inc.; H. K. Ferguson, H. K. Ferguson Co., Inc.; W. J. Austin, Austin Co.; L. J. Jordan, Industrial Rayon Corp.; R. D. Frick, Campana Corp.; Stanley M. Brown, Hygrade Sylvania Corp. Copies may be purchased from the association for $1.00.

Complete Survey

A survey recently completed by the Industrial Marketers of Detroit, chapter of the National Industrial Advertisers association, indicates that the most vital problem confronting industrial marketing and advertising executives of today is the securing of market information on industrial products. The second important problem is the co-ordinating of advertising in selling, indicating a growing recognition of the vital part advertising plays in industrial selling. The survey is being prepared by the chapter, as a part of the plan for the National Conference of Industrial Advertising and Marketing Executives to be held in Detroit, starting Sept. 18.

J. H. France Refractories Co., Snow Shoe, Pa., recently has opened an office at 225 Broadway, Room 4001, Transportation building, New York. The office will be in charge of Oliver H. Smith who has been connected with the main office for the past 10 years.

Conveyors Handle Molds in Foundry

AN INTERESTING application of modern conveying equipment to save time and effort in the foundry is shown in the illustration. Molds are made on machines at the left and are placed on push lines of roller conveyor for pouring. The broken line effect for the conveyor at the right indicates the location of roller conveyor turntables opposite the pouring storage line. These turntables permit the rolling of the poured molds directly onto the main line which passes them to the shakeout. A roller conveyor transfer car is shown in the center foreground. This operates on a short track and serves the second and third lines in the photograph, transferring molds directly to the main shakeout line since there is no turntable at the ends of those lines. Illustration courtesy the Logan Co., Louisville, Ky.

American Foundry School
REPORT CARD
NAME Penolyn Core Oil CLASS First
WORKABILITY A+
UNIFORMITY A+
BINDING QUALITIES A+
DECOMPOSITION AND CLEAN-OUT A+
ECONOMY A+
REMARKS: Penolyn Core Oil stands at the head of the class for consistent uniformity and increased workability. As a core-binder Penolyn takes first award. It wins the honors in preventing the moisture-absorption that cracks and deforms baked cores in storage.
Excessive gas generation presents no problem to Penolyn. When the perfect casting is removed, Penolyn assures complete clean-out decomposition.
Because rejects cost money and slow down production, Penolyn shines especially as a time and money-saver. Experienced foundrymen vote Penolyn as "most likely to succeed." Ask a Penola Engineer to show you how Penolyn can promote profits for your foundry.
REPORTED BY Experience (THE BEST TEACHER)
PENOLYN PASSES EVERY FOUNDRY TEST
PENOLA INC.
Pittsburgh, Pa. (Formerly Pennsylvania Lubricating Co.)
NEW YORK · CHICAGO · DETROIT · ST. LOUIS

Southern California

ELECTION of officers was held at the June 27 meeting of the Southern California Chapter of the A. F. A. at the Clark hotel, Los Angeles. Approximately 90 members were present. A. G. Zima, chairman of the chapter opened the meeting with a review of the year's activities and thanked the chapter for its co-operation in furthering the interests of the group. He then turned the meeting over to the new chairman, James Eppley, Kinney Iron Works, Los Angeles, who introduced the new officers and directors for the coming year: Vice chairman, Glen Merrefield, Warman Steel Casting Co.; treasurer, Earl Anderson, Enterprise Foundry Co.; secretary, W. F. Haggman, Foundry Specialties Co. Directors, G. E. Emmett, Los Angeles Steel Casting Co.; A. M. Barker, Barker Foundry Supply Co.; James O'Hara, Fraters Valve & Fittings Co.; H. E. McGowan, H. E. McGowan Co. W. D. Bailey, retiring chairman of the entertainment committee, presented the chapter on behalf of his committee, a fine new projecting machine for slides. Mr. Eppley then presented to retiring chairman, A. G. Zima, in behalf of the chapter, the engraved ring given to past chairmen. Following were announcements of committees for the coming year, and Jack Eberhart, chairman of the entertainment committee, announced the annual stag picnic. After the showing of several sound news reels Mr. Eppley introduced the principal speaker, Maj. Arthur R. Baird, U. S. army ordnance department, who addressed the group on the "Role of Industry in National Defense." Mr. Baird gave a fine discussion of the part of industry in the event of mobilization particularly from the foundry standpoint.—*W. F. Haggman, secretary.*

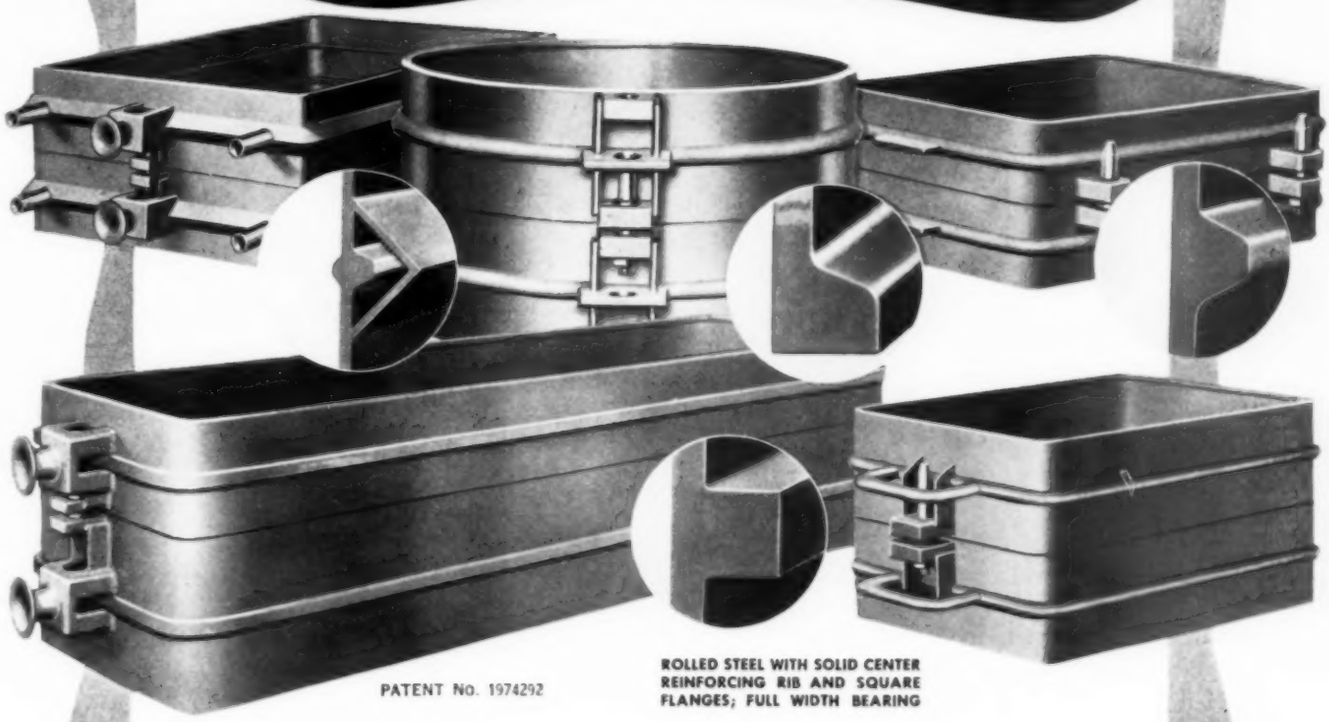
Northern Iowa

ANNUAL business meeting of the Northern Iowa Foundrymen's association was held at Black's Tea room, Waterloo, Iowa, May 28. Approximately 60 members and guests were present for election of officers for the coming year. Those elected are: President, C. A. Gosline, John Deere Tractor Co.;

(*Continued on page* 64)

Northern Illinois-Southern Wisconsin chapter of the A.F.A. holds an enjoyable outing. Photographs courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

Cost Saving



PATENT No. 1974292

ROLLED STEEL WITH SOLID CENTER REINFORCING RIB AND SQUARE FLANGES; FULL WIDTH BEARING

Analysis by impartial engineers has shown that Sterling Flasks save costs through their greater efficiency. Easier to handle, strong enough to give more hours of hard service. Sterling Flasks help to spread production. No job is too tough for their rolled-steel, all-welded construction. It will pay you to test the efficiency of Sterling Flasks on any work you have in progress. They are available in every size, style, and shape you may require. Write for full specifications, now.

3500 leading Foundries are using Sterling Flasks to cut costs. Follow their example . . . install Sterling Flasks NOW.

Sterling

WHEELBARROW COMPANY

7100 WEST WALKER STREET

MILWAUKEE, WIS.

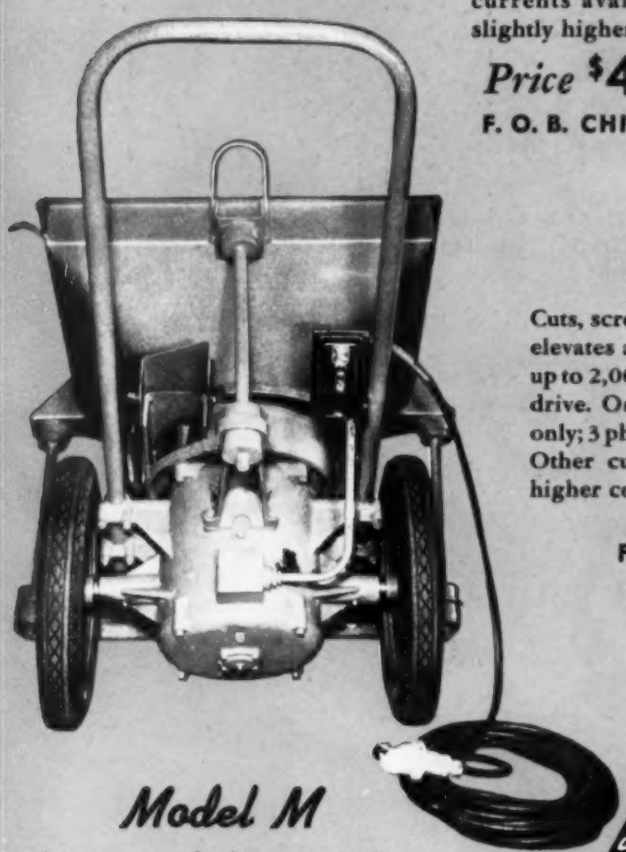
Screenarators ARE STREAMLINED for PORTABILITY

Choose from 3 MODELS

- Capacities to fit your shop.
- Prices to fit your purse.
- Shoveling height to fit the men.
- Pneumatic tires to fit rough floors.

Model S Cuts, screens, double aerates and piles up to 1,000 pounds per minute of *Screenarated* sand that improves castings and reduces sand costs. 2½ h.p. A.C. only; 3 phase, 220-440 volts, 60 cycles. Other currents available at slightly higher cost.

Price $440
F. O. B. CHICAGO



Model L

Cuts, screens, double aerates, piles or elevates as high as 15 feet. Capacity up to 2,000 pounds per minute. Direct drive. One moving part. 5 h.p. A.C. only; 3 phase, 220-440 volts. 60 cycles. Other currents available at slightly higher cost.

Price $985
F. O. B. CHICAGO

Model M

Cuts, screens, double aerates, piles or elevates as high as 15 feet. Capacity up to 1,500 pounds per minute. Direct drive. One moving part. 3 h.p. A.C. only; 3 phase, 220-440 volts. Other currents available at slightly higher cost. *Price* $535
F. O. B. CHICAGO

TRY A *Screenarator* AT OUR EXPENSE

It's easy to learn what a *Screenarator* will do in your foundry. You select the model that fills your requirements, then you write us for a *10-day free trial in your shop.* We want you to try before you buy because we know that *Screenarators* are your best investment in low cost, portable sand conditioning equipment.

THE BEARDSLEY & PIPER CO.
2541 NORTH KEELER AVENUE · CHICAGO

Order MODEL "M" Now!

$535 F.O.B. Chicago

Just like taking money from home to buy a Model "M" at such a low price. Figure it out for yourself. This workhorse cuts, screens, double aerates and piles up to 1,500 pounds of sand per minute. And it elevates the sand into bins 15 feet high when desired. Try it and see if you don't agree that it gives you greater capacity, better sand and far easier portability than you've ever seen in such a low priced sand conditioner. Use it for 10 days at our expense and you'll never part with it.

IT SCREENS

And how it screens! Faster than any two men in your shop can shovel. The whirling, spinning, tornado-like motion breaks the lumps while removing all foreign matter.

IT DOUBLE AERATES

Thoroughly good sand must be thoroughly aerated. It's the double aeration that makes screenarated sand more flowable and more rammable—better sand for better castings.

IT PILES

The adjustable discharge spout loads the sand in tote boxes, piles it in windrows, throws it as far as fifty feet, or elevates it into hoppers fifteen feet above the floor level.

IT ROLLS LIKE A BIKE

Screenarators *are the easiest to roll, most efficient, highest capacity, low cost portable sand conditioner on the market. Easily handled on the roughest foundry floors.*

SEND TODAY!

THE BEARDSLEY & PIPER CO.,
2541 N. Keeler Ave., Chicago

We would like to have a Model "M" *Screenarator* for a 10 day trial. How may this be arranged?

Foundry Name.....

Individual's Name.....

Street Number.....*State*.....

City.....

A large group of members and guests attended the outing of the Metropolitan Philadelphia Chapter

(*Continued from page* 60)

vice president, Ed Huss, Viking Pump Co.; secretary, J. Robinson, Construction Machinery Co.; treasurer, H. P. Hanson, Viking Pump Co., and sergeant-at-arms, Thomas Thompson, John Deere Tractor Co.

Retiring president, Fred C. Nus, reviewed the past year's activities, programs and speakers presented, and the increase in membership from 34 in 1939, to 106 in 1940. Those in attendance expressed their approval of the year's programs and it was suggested that the incoming officers continue with the same arrangements.

Carl Gosline, chairman of the picnic committee, reported that tentative plans had been made to hold the annual picnic at the Rotary Reserve, Saturday, July 20.

Speaker for the evening was L. P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland, who entertained the group with his enjoyable talk, "How To Lose Money on a Modern Chicken Farm."—*R. E. Wilke, secretary.*

New England

REGULAR monthly meeting of the New England Foundrymen's association was held at the Engineers club, Boston, June 12. Following dinner, Francis LeBaron, E. L. LeBaron Foundry Co., Brockton, Mass., and president of the association turned the meeting over to Charles Butler, Warren Pipe Co., Everett, Mass., who had charge of the evening's program and consisted of a panel discussion of practical, metallurgical and personal problems. Several speakers, well known to New England foundrymen, were chosen to be discussion leaders, each one first giving a brief talk on a chosen subject.

D. Frank O'Conner, Walworth Co., South Boston, discussed "Porosity in Nonferrous Castings." He exhibited several castings showing typical porosity and explained how various types of that defect came about. Great stress was laid on the importance of paying attention to details, in melting and molding, as a remedy, and it was explained that one important factor is the size of the gates. The speaker showed where considerable improvement in certain types of castings was secured by reducing the size of the gate. He also spoke on proper pouring temperatures.

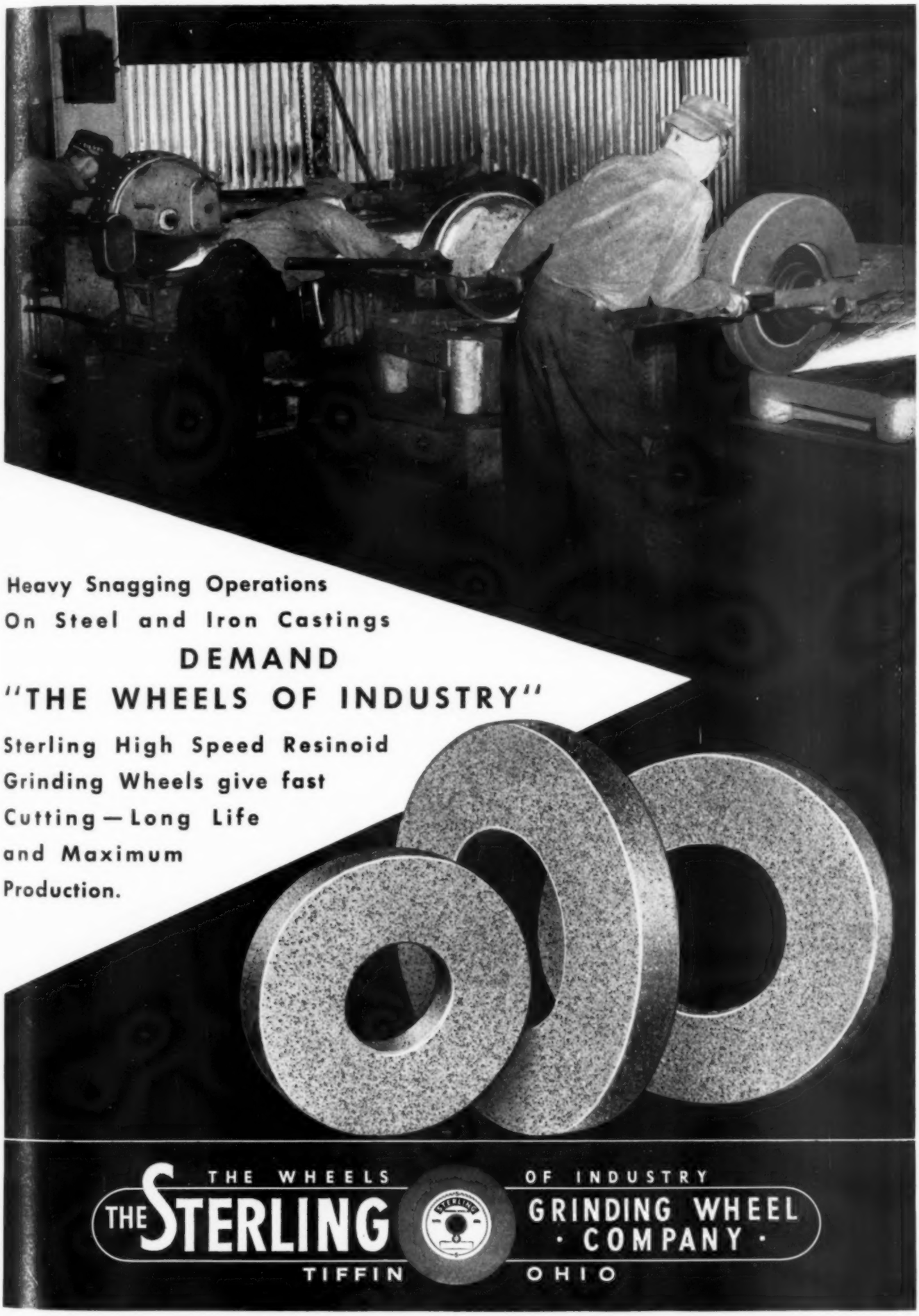
Next speaker was Alfred Leavitt, Merriman Bros. Inc., Jamaica Plain, Boston. Mr. Leavitt explained that he was particularly interested in the manufacture of high grade bronze parts for yachts and boats, particularly such parts as are made of manganese bronze. He took up the question of manufacture of these bronze parts to government specifications and also described briefly a high tensile manganese bronze which he said was being manufactured with a tensile strength up to 110,000 pounds. Mr. Leavitt laid great stress on the value of the pyrometer in maintaining good practice in bronze manufacture. He concluded by speaking of his interest in the organization end of the business, saying it was necessary not only to train the man under you, but to see that each worker has a chance to get ahead.

Following discussion leader was Walter M. Saunders Jr., Providence, R. I., who discussed "Combined Carbon in Cast Iron." He explained accurately what combined carbon is and what its purpose is in cast iron. In brief, Mr. Saunders explained that the amount of combined carbon formed in a casting depends upon the section size or cooling rate of the iron. He added that in the same section size, the higher the silicon, the lower the combined carbon. The factor to remember in connection with combined carbon is that it is not a constant throughout the casting and therefore the determination of it may be meaningless if thought is not given to where and how the sample is taken.

A. S. Wright, Hunt-Spiller Mfg. Corp., South Boston, led a discussion on "Gating of Castings." He explained that correct gates can eliminate and incorrect gates can cause many of the troubles encountered with castings. A correct gate allows iron to enter the mold easily with minimum commotion. That can be accomplished by watching a mold poured open occasionally to determine just what the effect of a gate is upon a stream of metal entering the mold. He also called attention to the good results obtained in many instances where the practice of placing the runner in the cope and the gates in the drag is employed.

John Walsted, Whitin Machine Works, Whitinsville, Mass., discussed, "Machinability," and described a test which his organization has been using with some success. Essentially it is the time required for a definite sized drill under a constant pressure and speed to drill a specific distance into the casting. Mr. Walsted said that they had attempted to keep all conditions constant even the angle to which the drill was sharpened and he showed several slides upon which were results justifying the uniformity and practicability of the test. He explained that the test was not invented by them, but it had been developed for use in their work and had been fairly successful in its

(*Continued on page* 66)


Heavy Snagging Operations
On Steel and Iron Castings
DEMAND
"THE WHEELS OF INDUSTRY"
Sterling High Speed Resinoid
Grinding Wheels give fast
Cutting—Long Life
and Maximum
Production.
THE WHEELS
THE STERLING
TIFFIN
OF INDUSTRY
GRINDING WHEEL
· COMPANY ·
OHIO

(*Continued from page* 64)

results on machinability tests.

After each speaker had concluded, Mr. Butler asked for questions and discussions, and the meeting proved to be a profitable one for those attending. President LeBaron announced that there would be no meeting in July and the August meeting would be held in Providence in the form of an outing as has been the case in previous years. —*M. A. Hosmer.*

Philadelphia

WEDNESDAY, June 12 was a gala day for the Metropolitan Philadelphia Chapter of the A.F.A. Approximately 250 foundrymen and their friends frolicked around Hi-Top Country club, Drexel Hill, Pa., playing baseball, tennis, golf, quoits and volley ball. A luncheon was served at midday and supper was served at 7 o'clock. Following supper Harry Taylor brought forth his bevy of girls and other entertainers which delighted the audience until nearly midnight. There was music galore, prizes for all the sporting events and many door prizes. Jack Robb, chairman of the entertainment committee, deserves much credit for the time and effort that he and his committee put forth to climax a most successful season. Following are the officers elected to carry on the work for the 1940-41 season: Chairman, R. J. Keeley, Ajax Metal Co., Philadelphia; vice chairman, H. Reitinger, U. S. Pipe & Foundry Co., Burlington, N. J.; secretary-treasurer, W. B. Coleman, W. B. Coleman & Co., Philadelphia; directors elected to serve 3 years, D. J. Peake, Florence Pipe Foundry & Machine Co., Florence, N. J.; J. T. Fegley, North Bros. Mfg. Co., Philadelphia.—*J. T. Fegley, chairman, publicity committee.*

Central New York

REGULAR meeting of the Central New York Chapter of the A.F.A. was held May 24 at the Onondaga hotel, Syracuse, N. Y. H. H. Judson, chairman of the chapter, presided. Immediately following dinner Mr. Judson introduced Ray Fleig, Smith Facing & Supply Co., Cleveland, and chairman of the Northeastern Ohio Chapter of the A. F. A., who spoke on, "Foundry Facings—Their Manufacture and Application."

Mr. Fleig stated that the best plumbagos are manufactured from Ceylon graphite, which is crystalline in structure and is not destroyed by grinding The carbon content with-

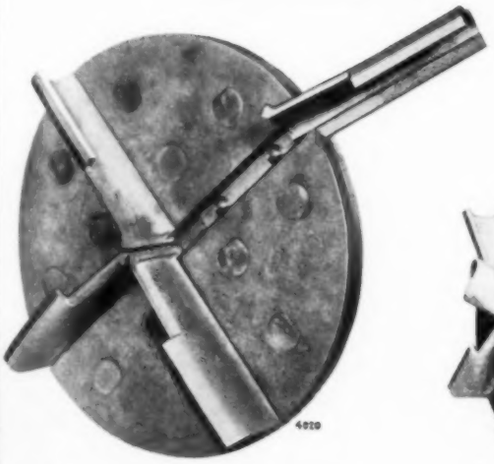
(*Continued on page* 68)

Views at Metropolitan Philadelphia Chapter's outing. Photos courtesy W. B. Coleman, W. B. Coleman Co., Philadelphia

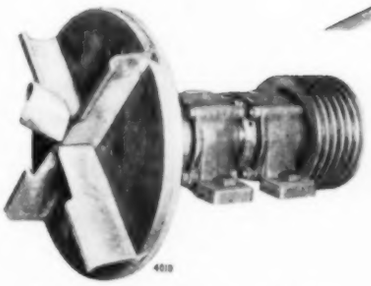
Offering

HIGH SPEED ABRASIVE CLEANING WITH ECONOMY

SLY CENTRI-BLAST



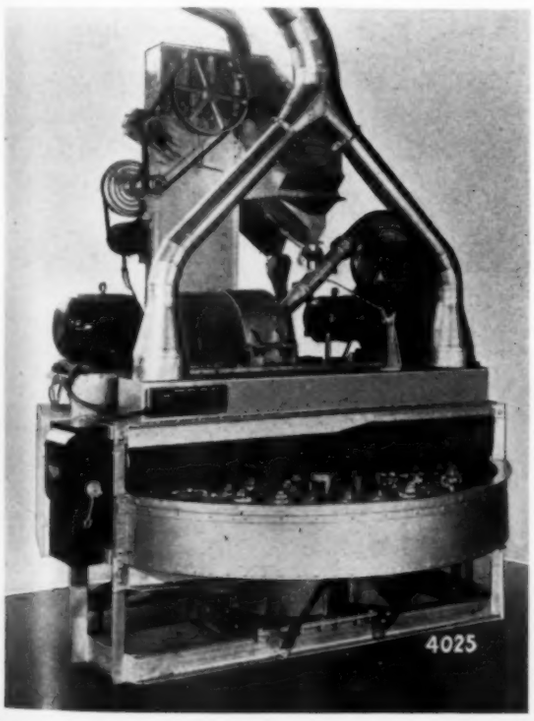
To replace a blade, simply loosen (do not remove) two screws, insert the new blade and tighten. *Quick and easy.*



A simple, sturdy wheel—extra heavy shaft and bearings — an oversize V-belt drive. *All for longer life.*

This improved method for high speed abrasive cleaning by means of a *centrifugal blast wheel*—

- Eliminates the use of compressed air
- Propels a much greater volume of abrasive—at higher speed with greater impact and
- Covers a greater area
- Results in faster cleaning
- Produces cleaner surfaces



This Sly Centri-Blast Rotary Table represents one application of the Sly Centri-Blast Wheel. Foundrymen are amazed at the great versatility and resourcefulness of this table for a wide variety of work. It handles efficiently and effectively small and intricate pieces, flat work, larger complicated castings. ★ This table offers distinct advantages in complete control of the cleaning by operator and thorough cleaning of all surfaces without waste of time, abrasive and power for over-cleaning.

SLY CENTRI-BLAST WHEEL

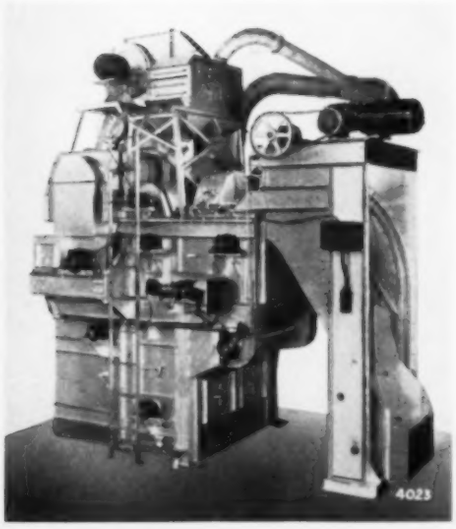
Simpler and More Effective

Simple, because

- No moving or wearing parts at abrasive feed.
- No crushing of abrasive.
- Only four sturdy, long life alloy blades.
- Quick and easy replacement of blades.

Effective, because

- New and different, with a positive abrasive feed.
- The blast is concentrated and directionally controlled for greatest blasting force.
- A blower imparts initial velocity to the abrasive and distributes it uniformly over the blades.



This initial velocity, plus centrifugal velocity created by the wheel, assures a more powerful blast.

Longer blades add velocity and uniform distribution to abrasive, hence greater cleaning force.

. . .

Sly Centri-Blast Cleaning Mill, complete with automatic loader. Another application of the Centri-Blast principle.

THE
W. W. SLY MFG. CO.

Established 1874
4753 Train Ave. Cleveland, Ohio
Offices in Principal Cities

ADVERTISING PAGES REMOVED

(*Continued from page* 66)

stands a higher temperature than the graphite secured from other sources which is porous and burns off readily. Mr. Fleig also added that the difficulty encountered by foundrymen with certain blackings was not due entirely to the blacking itself but to the structure of the blacking. A coarse graphite was recommended for green sand work. For core washes a low volatile content is necessary and, where these blackings were made soft in past years, they are now a harder material.

Method of mixing a core wash is an important matter. The mixing should be done the day before the blacking is to be used and should be mixed with a reciprocal motion. Where air is used to mix the blacking, the graphite is carried to the top by the air bubbles and therefore will cause separation. Use of blackings will not give a smooth surface to the casting but will stop the sand from burning on. Discussing sea coal, Mr. Fleig stated that the coal from which it is manufactured should be low in sulphur and ash content and that a good sea coal must gas quickly. Several articles by well known writers were read by Mr. Fleig explaining the use and action of sea coal in molding sand. Attention of the foundrymen again was called to the grain fineness of the sea coal as an important point to watch when using in conjunction with castings of light and heavy metal lines. Use of pitch as a core binder was described, the speaker stating that proper temperature to bake pitch cores is 500 degrees Fahr. If the cores are not baked at the proper temperature, the pitch will come to the surface and stick to the casting at the time of pouring. A pitch core, when properly baked, will clean out of the casting easily. Mr. Fleig closed his address after describing different types of parting —both dry and liquid—that are in common use today.

G. M. Thrasher, R. Lavin & Sons, Elmira, N. Y., presented the report of the nominating committee and the following officers were elected for next year: Chairman, Frank Wheeler, Kimman & Wheeler, Syracuse, N. Y.; vice chairman, E. J. Bair Sr., Utica Radiator Corp., Utica, N. Y.; secretary, L. D. Wright, United States Radiator Corp., Geneva, N. Y.; treasurer, Harold Boardman, Elmira Foundry Co., Elmira, N. Y. Director for 2 years to fill the unexpired term of Harold Boardman, Leo P. Fedigan, International Harvester Co., Auburn, N. Y.; directors for 3 years, H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y.; Prof. A. C. Davis, Sibley College of Engineering, Cornell university, Ithaca, N. Y.; Curtis M. Fletcher, Fairbanks Co., Binghamton, N. Y.—*L. D. Wright, secretary.*

Reading

NINETY-FIVE members attended the regular meeting of the Reading Foundrymen's association held May 21 at the Wyomissing club, Reading, Pa. John L. Carter, executive secretary, Newark Foundrymen's association, Newark, N. J., was the principal speaker, and presented an interesting talk on foundry cost accounting. He pointed out that it is essential to employ a system of cost accounting to realize the maximum profit possibilities of any jobbing foundry. While a few foundries make money without cost accounting, they could make more with a system, and many foundries are unsuccessful largely because they do not make proper use of cost accounting.

Cost accounting is valuable to management to determine selling prices, to control and reduce individual job costs, to control and reduce general operation costs, and to guide merchandizing policy. Mr. Carter outlined cost accounting

(*Continued on page* 71)

Candid shots taken at outing of Metropolitan Philadelphia Chapter by W. B. Coleman, W. B. Coleman Co., Philadelphia

(*Continued from page* 68)
methods which were suitable for the average gray iron jobbing foundry employing from 10 to 50 molders—discussing as he went along the reasons for using specific procedures. Conclusion of his talk was devoted to a discussion of costs as a guide to merchandizing policies wherein merchandizing means selection of the most profitable work to handle taking into account available market, competition, equipment and organization.

Detroit

MONTHLY golf parties, followed by dinner, entertainment and awarding of prizes, is the order of the summer for the Detroit chapter. The first was held June 27 at Brooklands Country club, with attendance of around 50, including as special guest, Edward J. Jeffries, mayor of Detroit.

The second golf outing was held July 18 at Clinton Valley Country club. Attendance was slightly over that of the previous month. Report of chapter activities and financial condition over the past fiscal year was presented by W. W. Bowring, Frederick B. Stevens Inc., chapter treasurer.—*A. H. Allen, secretary.*

Northeastern Ohio

DESPITE the decidedly inclement weather which threatened to engulf all and sundry for a while, L. P. Robinson, chairman of the entertainment committee, and official long distance weather forecaster of the Northeastern Ohio chapter received a 50-50 break on his fair weather prognostication for June 29. Nearly 250 members and guests of the chapter gathered at Lake Forest Country club, Hudson, O., to participate in the fifth annual outing and golf tournament. Over 100 entered the golf tournament. Feature of the outing was the annual baseball game between the vendors and foundrymen which was won by the latter making the overall standing at present, one game for the vendors, and four for the foundrymen. Following a chicken dinner at 7 p.m., Toastmaster Ray Fleig called on R. E. Kennedy, national secretary for a few words, and then upon Bob Robinson. Mr. Robinson introduced Leon Miller who announced and presented prizes to winners of various events.—*Edwin Bremer.*

Buffalo

ANNUAL election of officers and picnic of the Buffalo chapter was held on June 29 with 174 present. Following dinner, the annual meeting was held and officers for the ensuing year were elected and included John McCallum, McCallum-Hatch Bronze Co. Inc., chairman; Robert K. Glass, Republic Steel Corp., vice chairman; V. L. White-

Northeastern Ohio Chapter holds fifth annual outing. Photos courtesy Sterling Farmer, Sand Products Corp., Cleveland

head, Whitehead Bros. Co., treasurer; and Eliot Armstrong, Inter-Allied Foundries of New York State, secretary. New directors elected include John Reid, Symington-Gould Corp., Rochester, N. Y., Rheinhold D. Loesch, Lake Erie Foundry Co., Buffalo, and Joseph Kaufman, Harrison Radiator division, General Motors Corp., Lockport, N. Y.

During the picnic which followed every one participated in balloon races, golf driving contests, baseball throwing, distance guessing, shoe races, and a 9-inning baseball game. Numerous prizes donated by various suppliers were presented to winners of various events.—*J. R. Wark, secretary.*

Book Review

Aluminum Alloy Patent Compilation, Parts 1, 2 and 3 (Aluminiumlegierungen Patentsammlung), by G. Apel, paper, 1877 pages, 6¾ x 10 inches, published by Verlag Chemie, Berlin, Germany.

These three volumes, which are printed in German, form a part of the section of Gmelin's Handbook of Inorganic Chemistry which is devoted to aluminum and its alloys. They are arranged in tabular form giving information from patents from the leading countries relative to compositions, trademarks, and inventors. Previous volumes have listed patents up to 1935, but these bring them up to more recent times, covering the period from the beginning of 1935 up to and including February, 1938.

Alloys are listed according to the alloying elements as signified by the chemical symbols. The first part lists aluminum alloys containing bismuth (Bi) to tungsten (W); the second, those containing up to 8 per cent zinc, and the third lists alloys containing from 9 per cent zinc to 13 per cent zirconium. Due to the fact that the tables are in concise form, little knowledge of German is required to understand the data presented in this foreign language publication.

License Needed to Export Machines

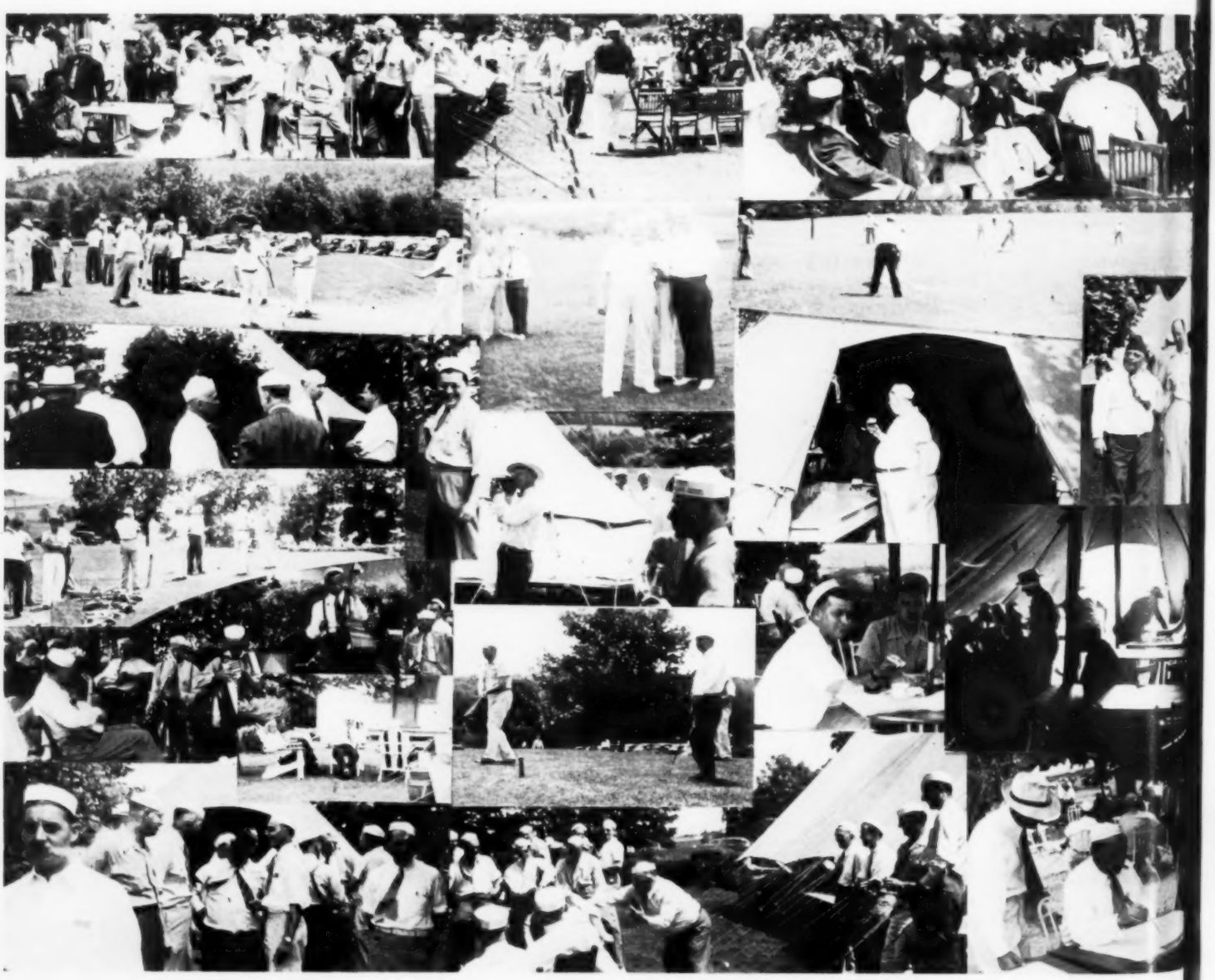
Recent proclamation of the President making it necessary to secure a license to export certain basic materials, chemicals, manufactured products and machine tools, also lists metal working machinery for melting or casting, pressing into forms, cutting or grinding, and welding.

While the section of the proclamation dealing with metal working machinery seems ambiguous, the control board of the department of state, which is in charge of the issuance of licenses, has indicated that no interpretation as yet has been made and that none is in sight. Officials of the department state that each shipment of machinery in these classifications will be handled as a specific problem.

It has been suggested that equipment manufacturers send a description of the machine which is to be

(*Concluded on page* 74)

Views taken at annual outing of the Reading Foundrymen's association. Photos courtesy H. P. Good, Textile Machine Works, Reading, Pa.



Getting Salesmen's Co-operation

Tying in Advertising with Selling

Getting out into the field

Copy Testing

DIRECT MAIL

Layout, Copy and Illustration

Market Information

contributing to the solution of general company problems

Readership of Publications

Measuring Results

ALLOCATION OF BUDGETS

Programs that management will approve

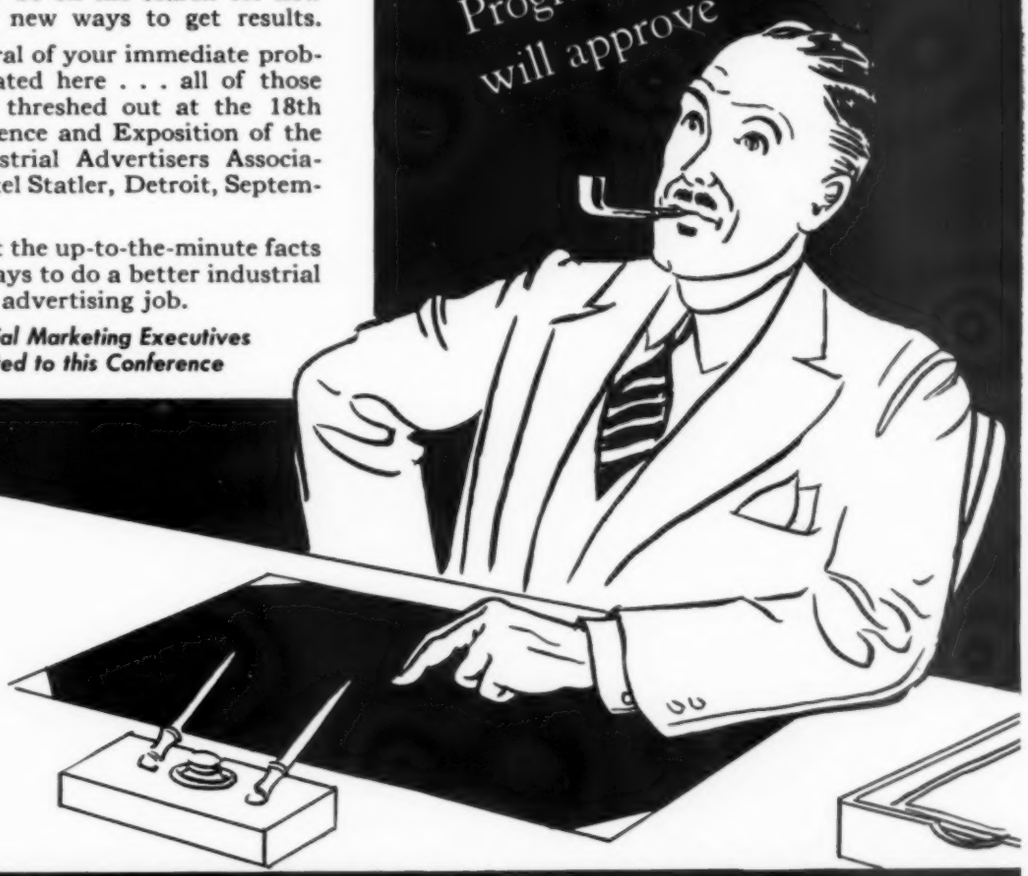
WHAT'S YOUR PROBLEM?

Your business . . . in at least one respect . . . is no different from others: ***Your marketing problems are constantly changing.*** You must ever be on the search for new ideas . . . for new ways to get results.

No doubt several of your immediate problems are indicated here . . . all of those shown will be threshed out at the 18th Annual Conference and Exposition of the National Industrial Advertisers Association, at the Hotel Statler, Detroit, September 18, 19, 20.

Plan now to get the up-to-the-minute facts on the latest ways to do a better industrial marketing and advertising job.

All Industrial Marketing Executives are Invited to this Conference



NIAA
NATIONAL INDUSTRIAL ADVERTISERS ASS'N.

1940 INDUSTRIAL ADVERTISING CONFERENCE

DETROIT . . . HOTEL STATLER . . . SEPTEMBER 18, 19, 20

(*Concluded from page 72*)
exported to the army and navy munitions board at Washington. If the board recommends a license, the manufacturer can proceed with the production of the machine and make a formal application as required by the President's proclamation. This applies to both standard and special machines.

Proposed Standard

American Society of Mechanical Engineers, 29 West 39th street, New York, recently has published a proposed American standard, "Surface Roughness" which classifies various gradations of roughness and defines them. It also provides simple symbols for designating the several grades on drawings, specifications, etc. The standard relates only to the root mean square average of heights of surface irregularities. Copies of the standard may be obtained from the society for 30 cents each.

Simplified practice recommendation R154-38, "Cupola Refractories," has been reaffirmed without change according to the division of simplified practice, bureau of standards, Washington. It establishes stock sizes of cupola blocks, tap-out and slag-hole blocks. Copies of the recommendation may be obtained from the superintendent of documents, Washington, for 10 cents each.

Book Review

Machining of Metals, cloth, 176 pages, 6 x 9 inches, published by the American Society for Metals, Cleveland.

This interesting volume is a compilation of five lectures presented at the 1938 meeting of the American Society for Metals, and is a valuable contribution to literature on machining. Lecture I by Hans Ernst discusses the physics of metal cutting. Lecture II is on machinability of ingot iron, wrought iron, S. A. E. steels and stainless steels, by Harry B. Knowlton.

Lecture III on some factors affecting the machinability of cast steel, cast iron and malleable iron is by J. W. Bolton. Lecture IV by A. H. d'Arcambal and W. E. Bancroft discusses the machinability of tool steels, while Lecture V on the machining of nonferrous metals is by Harry P. Croft.

Firm Is Organized

Grindle Fuel Equipment Co., 3222 North Halsted street, Chicago, recently has been organized to succeed the Pulverized Fuel Equipment Co. and the Gaskoal Corp. The new organization will market pulverized fuel equipment and furnaces. The company will produce a rotary melting furnace for continuous melting of malleable and high test gray iron, as well as nonferrous metals. The company also will specialize in the application of pulverized fuel equipment to metallurgical furnaces and industrial processes.

Expands Laboratory

Laboratory of Microchemistry, 36 Fifth avenue, New York, is expanding its space and facilities, according to Dr. Carl Tiedcke, director. Identification of foreign specks and substances in products is one of the firm's services as well as usual and unusual elementary analyses with particular attention to industrial research problems and biochemistry.

Issues Booklet

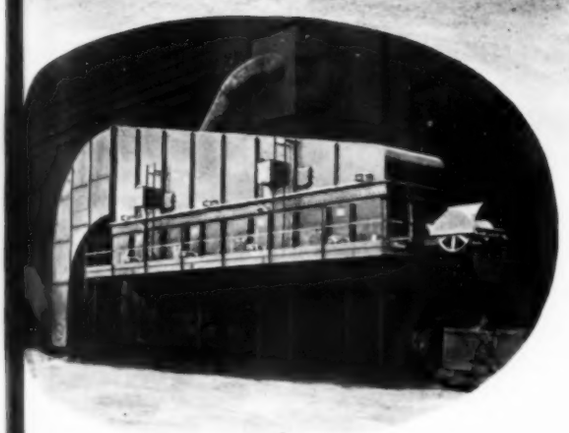
American Management association, 330 West Forty-second street, New York, recently has issued a booklet entitled, "Effects of Environment and Atmospheric Conditions on Workers," with articles by Dr. S. N. Stevens, Northwestern university, F. C. Houghten, American Society of Heating and Ventilating Engineers, and G. F. Begoon, Westinghouse Electric & Mfg. Co. The booklet may be secured from the association for 75 cents.

Schmeig Sheet Metal Works, Detroit, recently has completed a new unit covering 7000 square feet, and has installed new equipment.

Pittsburgh Foundrymen's association enjoys outing. Photos courtesy Sterling Farmer, Sand Products Corp., Cleveland

This dust hood is doing "a job that couldn't be done"

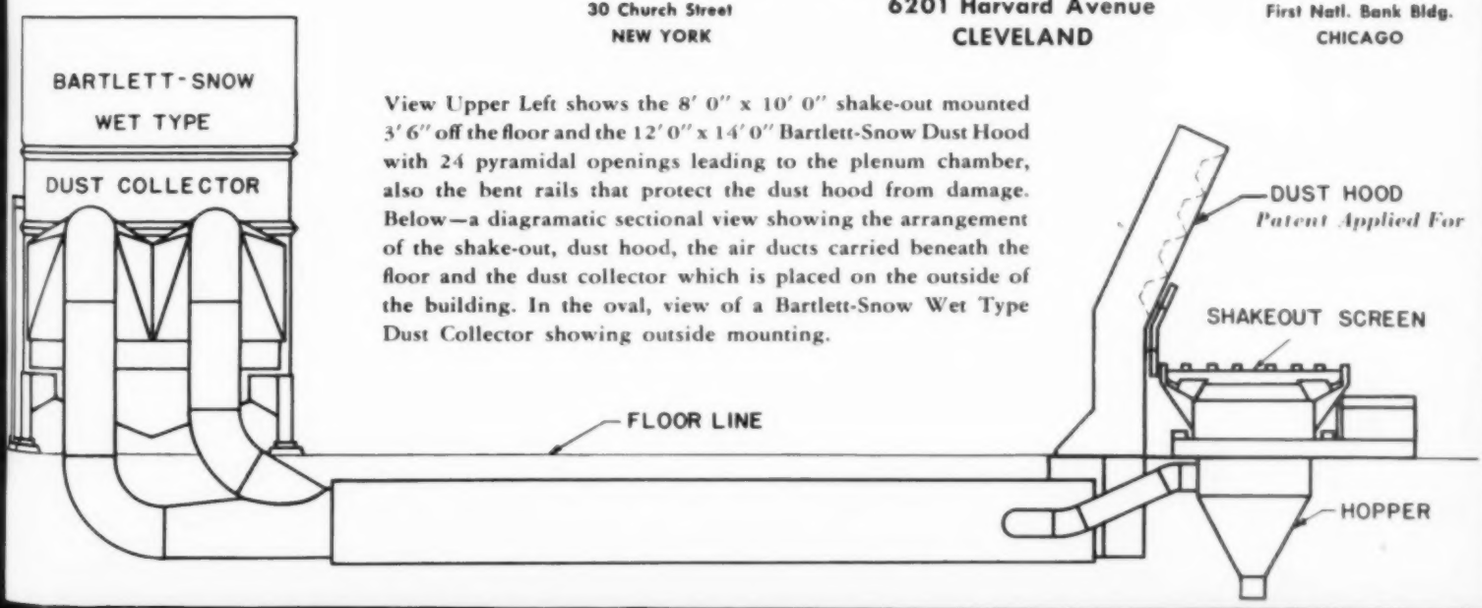
Handles 33,000 Cu. Ft. of Air a Minute to Clean Up an Exceedingly Severe Dust Nuisance



● The dust nuisance resulting from shaking out dry sand molds was so severe in this foundry that the crane operator, who was of necessity directly over the shake-out, had to use a gas mask. It was impossible to see even 10 ft. in any direction when a flask was being shaken out. After other remedies had failed a Bartlett-Snow Side Wall Dust Hood 12′ long by 14′ high, having 24 pyramidal openings into a plenum chamber, and connected to a Bartlett-Snow Wet Type Dust Collector was installed. With this equipment it is possible to shake out flasks 7′ long, 3′ wide and 3′ high on the most distant edge of the shake-out without any visible dust loss whatever, and even to handle flasks 17′ long, 5′ wide and 3′ high with only slight traces of dust loss even though these flasks are 7′ longer than the shake-out itself. We solicit your inquiries. More complete details will be furnished on request.

THE C. O. BARTLETT & SNOW COMPANY

30 Church Street NEW YORK | 6201 Harvard Avenue CLEVELAND | First Natl. Bank Bldg. CHICAGO



View Upper Left shows the 8′ 0″ x 10′ 0″ shake-out mounted 3′ 6″ off the floor and the 12′ 0″ x 14′ 0″ Bartlett-Snow Dust Hood with 24 pyramidal openings leading to the plenum chamber, also the bent rails that protect the dust hood from damage. Below—a diagramatic sectional view showing the arrangement of the shake-out, dust hood, the air ducts carried beneath the floor and the dust collector which is placed on the outside of the building. In the oval, view of a Bartlett-Snow Wet Type Dust Collector showing outside mounting.

BARTLETT-SNOW

ENGINEERS, DESIGNERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

Complete Structural, Machine and Plate Fabricating Facilities to Meet Any Requirement

ADVERTISING PAGES REMOVED

Reader's Comment

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Silvery Iron

TO THE EDITORS:

Every month we await with interest the arrival of your magazine, and in the past have gleaned much useful and worthwhile information from the articles printed therein.

However, the Question and Answer department in the May issue contains statements which we do not believe give the foundryman a complete picture of the silicon situation as it applies to his cupola operation.

The question we have reference to is the following: "What extra materials and how much are required to make good machinable castings from an all scrap charge?"

In the answer, pig iron, ferrosilicon, and briquets were all mentioned as possible sources of silicon but no mention was made of silvery pig iron, which is one of the most widely used materials as a sweetener in all-scrap charges and which has certain other advantages in analysis, physical structure, melting point and cost. Silvery pig iron has long been used by foundries everywhere in charges which are high in cast scrap and steel, and for silicon control in general. It can be had with silicon content ranging from 6 to 16 per cent.

BRADLEY H. BOOTH
Jackson Iron & Steel Co.
Jackson, O.

Smooth Face

TO THE EDITORS:

In the March issue of THE FOUNDRY I read an article in the "Questions and Answers" section entitled, "Zinc Castings Lack Smooth Face" toward which I may be of some assistance.

At the plant where I am an inspector in the plaster pattern and foundry we use a mixture of Albany and San Diego sand and riddle fine sand on the face of the pattern before ramming up the flask. Before putting the bottom on the flask we vent the mold by ramming a piece of 1/16 wire through the mold to the face of the pattern in rows approximately 3 inches apart and 3-inch spacing. After the pattern has been drawn, we skin dry the mold and pour. To stop the casting from drawing from the face side the mold must be kept open and allowed to cool from the face side, we do this by placing a sheet of ¼-inch asbestos over the mold immediately after pouring and allow it to remain until the casting has cooled sufficiently to preclude its shrinking from the face side.

The mold may be kept open with charcoal or by agitation with a stick. Both of these methods have been used by us with good results. We pour the mold to within about ¾-inch of the top and after the casting has cooled we pour this ¾-inch on in the form of a cap, this makes for a smooth bottom. The use of chill plates in the depression caused by the shrinking of the casting is strongly recommended as this removes the danger of the molten cap pouring through to the face of the casting. This method produces a casting with a very smooth face which takes very little sanding and in the case of the die being used to form stainless steel we do not finish the die at all but let the steel shine the die as it is used.

I believe that this method will prove satisfactory to whomever was aking the question.

LEONARD J. STRONG
301 *West Spruce avenue*
Inglewood, Calif.

Book Review

Quantitative Spectrographic Analysis with the Microphotometer, by D. M. Smith, paper, 24 pages, 6 x 9¾ inches, published by the British Nonferrous Metals Research association, Euston street, London, England.

Rapid progress in quantitative spectrographic analysis due to introduction of the microphotometer also has resulted in more rigid control of the standardization of electrical and optical conditions for routine analysis. This volume, which is part I of a series, is a review of published work, and is concerned with the nature and control of the variables encountered in standardization of technique. Subjects discussed include size and shape of electrodes, presparking period, illumination, blackening curves, interpretations of density measurements, calibrations, etc. Report data also are presented in tabular form with bibliography references on aluminum, copper, lead, magnesium, nickel, tin and zinc.

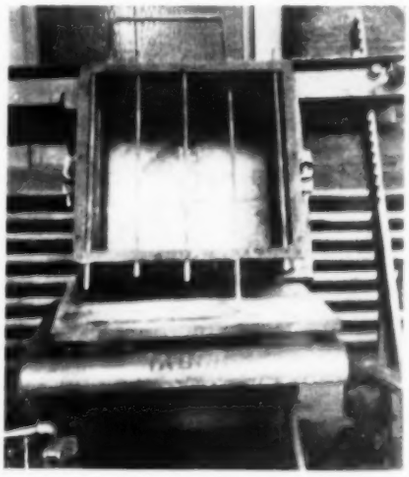
Pittsburgh office of the Cutler-Hammer Co., Milwaukee, has moved to new quarters located in the Park building, 355 Fifth avenue. T. L. Towle is manager of the territory.

Molds Made Without Bottom Boards

By Edward Grant

The accompanying illustration shows a method used recently in the foundry connected with a Mid-West college for the production of 600 small plates 1 x 5 x 7 inches. Production was scheduled for 75 molds per day, but a sufficient number of bottom boards were not available. Molds were made in a tapered aluminum flask, 12 x 12 inches, with a 3-inch deep drag and a 4-inch cope. The drags were jolted on a machine and the copes were rammed by hand on the bench. The procedure permitted production of complete molds with reasonable rapidity.

Five narrow slots were milled in the lower edge of the drag on two opposite sides. A thin steel strip was screwed to the edge all around. Five pieces of ¼-inch steel rod approximately 16 inches in length were prepared for use in the slots. After the drag was jolted the rods were inserted through the slots at one side and shoved forward until the ends entered the slots on the opposite side of the flask. The sand then was butted with a hand rammer and the surplus sand removed with a short straight edge. A smooth, temporary bottom board was set in place and the drag was rolled over. After the pattern was removed and the mold dusted with blacking, the drag resting on the bottom board was lifted and carried to a sand bed leveled on the floor with a shovel. In transferring the drag from the bottom board to the sand bed, the rods prevented the sand from falling out. The drag was rubbed down to a bearing, the cope was set in place and the rods were removed and placed in service on the following mold. The method worked satisfactorily, enabling production to proceed.



Five ¼-inch steel rods in the bottom of the drag held the sand in place

Abstracts

FROM WORLD FOUNDRY LITERATURE

Magnesium Alloys

Casting Alloys of Magnesium, by Dr. A. T. Steer, *Metal Treatment*, quarterly Winter 1939-40, London, England.

The author points out that only a fraction of the attention is being given to magnesium alloys in Great Britain as in Germany. After brief historical reference the author discusses fluxing and melting, and then describes various alloys used for casting. In discussing effect of various elements Steer points out comparatively few magnesium-rich alloys are available because in general, most alloying elements tend to increase some properties at the expense of others. For example, silicon and cerium increase strength at elevated temperatures but increase corrosion liability—and silver and tin increase resistance to action by chlorides but promote corrosion in air. The author also gives some detail about methods to prevent corrosion of magnesium alloys by chromate treatments.

Gases in Cast Iron

A Preliminary Study of Gases in Cast Iron, by W. Y. Buchanan, *Foundry Trade Journal*, London, England, Dec. 21, and Dec. 28, 1939.

First section of this article gives brief abstracts from literature while the second presents detailed information and conclusions from the author's investigation of the subject. His conclusions follow: Sparking said to indicate oxidation or gassy metal is incorrect since it occurs with high temperature and low silicon range, whereas gas volume may be much greater in high silicon iron. Fluidity and life must play an important part in the ultimate importance of the quantity of gas present as for example, good castings can be had from high phosphorus or high carbon, high silicon, medium phosphorus iron even with excessive gas content, but the element of risk will always be present. Moisture is the cause of most gas formation in cast iron. Gas escaping rapidly through metal may, to a certain extent, delay freezing locally. In high duty irons presence of gas is more serious than in low grade irons, owing to the tendency to low fluidity and life. Apart from many causes of gas holes, dissolved gas always must be an additional contributing factor.

Enamelled Castings

Castings for Enamelling, by J. A. Donaldson, *Foundry Trade Journal*, London, England, Dec. 14, 1939.

Beginning with the fundamentals of design, the author discusses various enamelling defects due to improper design, and how they can be eliminated by correct design. Causes of such troubles include abrupt change in section through use of bosses and heavy ribs, deformation of flat castings due to abrasive blasting, sharp edges, etc. As far as composition is concerned, the author points out that the iron should have a close grained gray fracture, high density, and good mechanical strength, and that close attention should be given to chemical composition. Silicon content should be such as to give in the final casting from 0.40 to 0.60 per cent combined carbon. Sulphur and phosphorus should be as low as is practicable.

Gray Iron Properties

Properties of Gray Cast Iron with Special Reference to the New B. S. Specifications, anonymous, *Foundry Trade Journal*, London, England, Sept. 21, 1939.

This article constitutes a report of the subcommittee of the technical committee of the Institute of British Foundrymen, and discusses various points of the new British standard specification (British Standard Specification No. 321) for gray cast iron. The present standard includes 5 test bar sizes instead of three. One bar 0.6 inch in diameter is for castings not exceeding ⅝-inch thick; a second bar is 0.875-inch diameter for castings from ⅝ to ¾-inch thick, a third bar is 1.2-inch diameter for castings from ¾ to 1⅛ inches thick; fourth bar is 1.6-inch in diameter for castings from 1⅛ to 1⅝ inches thick, and the fifth bar is 2.1 inches in diameter for castings over 1⅝ inches thick.

British Standard specification No. 786 for high duty cast iron also is discussed. It relates to three classes of iron termed grade 1—high quality engineering iron made by ordinary process; grade 2—highest grade engineering castings made by use of high steel mix, alloy additions, etc.; and grade 3—irons made by special process such as inoculation, superheating, etc. The specification gives tensile requirements for different size bars mentioned previously. Following is typical: Bar size 0.875-inch—grade 1—15 tons per square inch; grade 2—18 tons per square inch, and grade 3—22 tons per square inch.

Heat Resisting Steel

Corrosion and Heat Resisting Steels, by W. B. Thompson, *Canadian Metals and Metallurgical Industries*, Toronto, Ont., Canada, October, 1939.

This article is concerned with the properties required in servicing and their development by proper manufacturing methods, particularly from the casting viewpoint. The discussion begins with corrosion resisting steels and deals with the straight 18-8 austenitic alloy and presents reasons for failure under certain conditions. It is pointed out that reduction of carbon to low values improved the steel, but was not entirely effective. The author then describes the stabilized 18-8 alloys containing molybdenum, silicon, tungsten, titanium, columbium, and applications of those compositions.

Turning to heat resisting steels, the discussion points out that a much wider range of compositions are available, and gives information on a number of them According to the author, design of castings is important in securing a product homogeneous in grain structure, sound and solid throughout. One of the most popular alloys with Canadian consumers is that containing 28 per cent chromium and 15 per cent nickel which combines good heat and corrosion resisting properties and maintains much of its strength and toughness at elevated temperatures even with intermittent heating and cooling cycles.

Nonferrous Molding

Some Problems of Nonferrous Foundry Practice, by W. J. Treloar, *The Australasian Engineer*, Sydney, Australia, Jan. 8, 1940.

This article, which is general in nature, covers a broad field with brief discussions or descriptions of various phases of nonferrous founding. The author points out the value of good patterns and then gives a brief review of molding methods. Cores and coke and oil-fired furnaces are touched upon, and then the author turns to brief discussions of the characteristics of the more common nonferrous metals and alloys used in the foundry.

Casting Temperature

Effect of Casting Temperature on the Primary Microstructure of Cast Irons, by A. L. Norbury, *Foundry Trade Journal*, London, England, Nov. 9, Nov. 16 and Nov. 23, 1939.

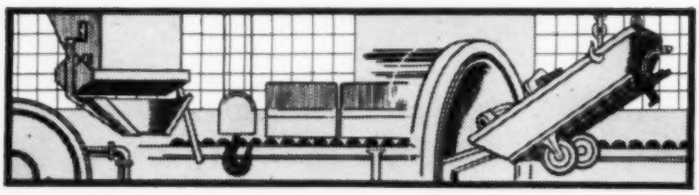
This rather extensive and illuminating series of articles is divided into five principal parts of which the first serves as the introduction. Part II describes effect of casting temperature and chilling on microstructure of hypereutectic white cast iron. Part III is concerned with effect of casting temperature and chilling on microstructure of gamma hypo-eutectic white cast iron. Part IV discusses effect of casting temperature and chilling on the microstructure of gamma and delta hypo-eutectic gray cast irons. Part V gives the author's theory of solidification of iron-carbon alloys. A concluding appendix describes effects of alloying elements on stability of iron carbide.

Monolithic Linings

Practical Application of Monolithic Linings in Cupolas, by F. Oldershaw, *Foundry Trade Journal*, London, England, Dec. 7, 1939.

The author describes installation of a monolithic lining, 13 inches thick, in a 78-inch shell diameter cupola. The first row of firebrick was left intact. A circular template 12 to 18 inches high was used, and the lining material was rammed as densely as possible to a point about 6 feet above the bottom bed of the well. From that point 3 or 4 courses of circular firebrick were used, followed by courses of cast iron blocks to the top of the charging door. Drying of the lining took about 3 or 4 days. Patching finally was accomplished by making small bricks or blocks of the plastic material in a press. Those are allowed to air dry, and placed in position with moist plastic as if using a brick.

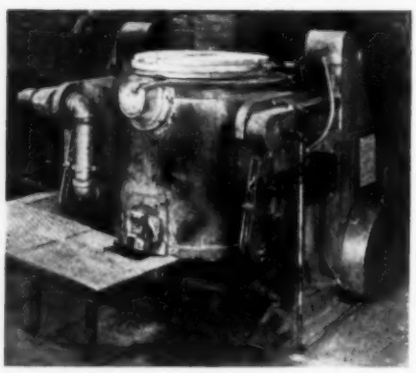
NEW EQUIPMENT



AND SUPPLIES

Nose Pour Furnace

Fisher Furnace Co., Chicago, has developed a new motorized nose-pour furnace, shown in the accompanying illustration. Furnace is



mounted on trunnions so that pouring axis is the same as that for the lip, and the pouring operation is motorized with positive-safety, finger-tip control. Tilting speed is factory-regulated to a standard of 90 degrees in 1 minute, although it may be altered through different gear ratios. Furnace is constructed low to facilitate charging and observation during operation. The unit is available in several sizes to accommodate No. 150 to No. 400 crucibles with ratio of combustion chamber area to size of crucible designed so that minimum fuel consumption is obtained. Furnaces may be oil or gas-fired.

Tractor

Clark Trucktractor division, Clark Equipment Co., Battle Creek, Mich., has developed a new industrial tractor, shown in the accompanying illustration. Capable of pulling 25 tons on trailers, the machine is compact to travel easily on crowded aisles, through narrow doorways and on congested platforms. Twin wheels at the bow provide stability and assist the tractor in negotiating rough roadways.

The tractor is capable of 24-hour continuous operation. A 4-gallon gas tank is sufficient for the average day's consumption. The machine has an overall width of 38¼ inches; 57 inches turning radius; speed of 8 miles per hour. Equipment includes self-starter, hydraulic brakes in rear drive wheels, air cushion tires in rear, solid in front, universal coupler operated by driver, all safety features to meet underwriters' inspection departments. The company also has in-

troduced a heavier model capable of pulling 40 tons on trailers over damp and slippery floors and steel ramps and for pushing heavy objects into position.

Unit Blower

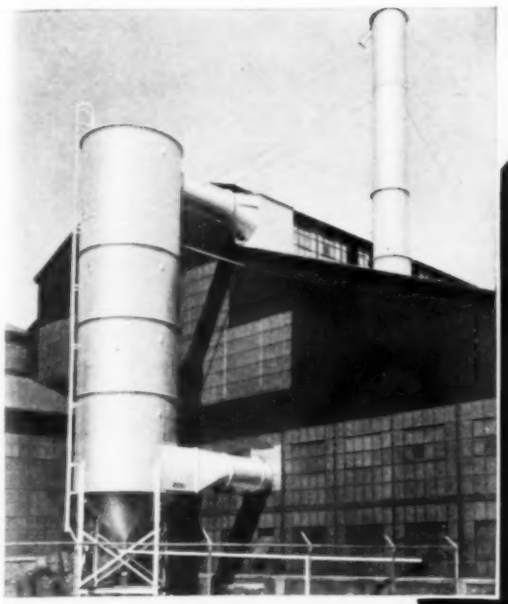
Autovent Fan & Blower Co., 1805 North Kostner avenue, Chicago, has developed a V-belt drive unit blower to meet a specific need for a combined unit especially adapted for installation where on account of local conditions, this type of drive is preferred to a direct connected blower. The motor is mounted on a steel pedestal base built integral with the blower housing. It is claimed these units can be set up for almost any motor combination making it possible to meet any desired performance. Adjustments can be made on the job and replacements can be obtained from stock. The device is available in wheel diameters from 12½ to 25 inches.

Gyratory Riddles

Great Western Mfg. Co., Leavenworth, Kans., announces refinements and improvements in a line of gyratory riddles made in four sizes. The smallest size is equipped with a 1/6-horsepower totally enclosed vertical motor operating at 900 revolutions per minute, a renewable sieve and a special clamping device. It has a capacity of about 10 men riddling by hand. The second size operates with a 1/3-horsepower totally enclosed vertical gear head motor, is equipped with removable sieve and runs at a speed of 287 revolutions per minute. It is claimed this machine sifts, mixes, aerates and fluffs the sand and is particularly useful for cleaning sand heaps, mixing facings or sifting sticky core sands.

The third machine operated by similar motor at same speed is equipped with a special tailout, shown in the accompanying illustration, which makes it unnecessary to remove or dump the sieve. Scrap metal and other foreign materials are discharged automatically into a wheel barrow or other container. The operation is continuous. The fourth and largest of the four is operated with a ½-horsepower motor running at 900 revolutions per minute. The ruggedly built machine is equipped with a removable steel sieve and has a capacity equal to

the work of 30 men working by hand. The sieve is 36 inches diameter and the device is claimed to be particularly suitable for brass and aluminum foundries.



Schneible Multi-Wash provides better working conditions by completely removing dust and fumes from this large production foundry. Schneible "Uni-Flo" Dust Hoods thoroughly ventilate shake-outs in same plant.

Don't be Pound Foolish!

In buying dust suppression equipment, don't be penny wise and pound foolish —consider all the facts—

Constant high efficiency—
Low operating back pressure—
Low velocity operation—
Low operating cost—
Low maintenance cost—
Low water consumption—
Low sludge disposal cost—

Then, if the equipment you select provides all these cost-cutting essentials, *and only the Schneible Multi-Wash System does,* you have the best dust and fume collection system that money can buy.

The old adage applies in dust collectors, as in all other things—first cost is not final cost. Schneibles cost far less in the long run!

CLAUDE B. SCHNEIBLE COMPANY

3951 Lawrence Avenue
Chicago, Illinois
Offices in Principal Cities

SCHNEIBLE

Grinder

Hammond Machinery Builders, 1605 Douglas avenue, Kalamazoo, Mich., announce a new wide swing grinder which it is claimed is espe-

cially desirable on bulky work or on any application where extra working space around the wheels can be used to advantage. The machine is driven by a totally enclosed 3 horsepower motor and protected by 14-inch boiler plate guards spaced 36 inches between wheels. Spindle of this heavy duty grinder, net weight 915 pounds, operates on four ball bearings.

Air Separator

Chicago Mfg. & Distributing Co., 1928 West 46th street, Chicago, has introduced an air separator for compressed air lines which operates

through centrifugal action in three chambers, as shown in the accompanying illustration. The device has no moving parts to adjust or replace. There are no inside filters, stones, screens etc. It is claimed the only maintenance needed is to open the drain cock and blow out thoroughly at least once a day or more frequently, depending on how much condensate the air is carrying. The entire unit is high grade corrosion resistant, cast aluminum accurately machined and synchronized to control air action. Loss of pressure is prevented by large passages throughout cleaning units. It is stated the device should be installed at or near point of use. The device is available in three sizes: 15 to 20 cubic feet per minute capacity, 5 inches diameter, 10 inches high maximum pipe size 1/2-inch, weight 5 pounds; 25 to 35 cubic feet capacity, 6 inches diameter, pipe size 3/4-inch, weight 9 pounds; 50 to 60 cubic feet per minute capacity, 7 inches diameter, 15 inches high, pipe size 1-inch, weight 11 pounds..

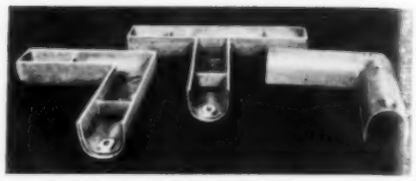
Industrial Sirens

Federal Electric Co. Inc., 8711 South State street, Chicago, has developed a wide variety of industrial signal horns and sirens which are operated with compressed air and by electric motors. They may be used for a multitude of applications including a start and stop signal for

workers, fire alarm, emergency warning, code calls for departments or individuals, etc. Signals delivered by the horns and sirens are such that they can be heard easily through a confusion of sounds. Accompanying illustration shows one type which is operated with a 1/3-horsepower universal motor. It is 13 inches long, 9¼ inches in diameter, 15 inches high and weighs 14 pounds. Tone is deep, and the siren is weatherproof.

Wall Caps

American Manganese Steel division of the American Brake Shoe & Foundry Co., Chicago, recently has placed on the market a type of manganese steel wall cap, shown in the accompanying illustration, and developed first for use in the company's own six foundries. The caps are manganese steel highly resistant to impact and also nonmagnetic.



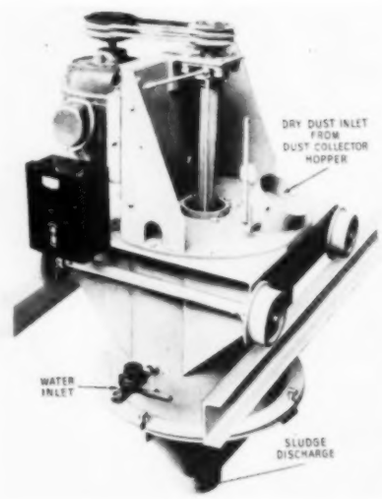
The caps are applied to the wall tops of bins containing ferrous melting stock customarily handled by a magnet. The nonmagnetic austenitic manganese steel prevents fouling by the magnet or the possibility of pulling the caps loose.

Through their shock resistance it is claimed the caps stand up against the inevitable banging of grab buckets or magnets. Individual lengths reinforced with interior ribs may be welded into various units, tees, ells, or long straight sections. They are attached to the wall by studs set in place during erection. Slots in the countersunk bolt holes permit grout to be funneled into the hollows between the wall top and the cap to insure a solid seating for the cap castings on the wall.

Dust Disposal

American Foundry Equipment Co., Mishawaka, Ind. has introduced a wet disposal unit designed for wetting and mixing with water or other liquid the collected dust discharged from the hoppers of cloth filter type or other types of dry dust collectors. The new unit, shown in the accompanying illustration, is a self contained mixer which receives dry dust from the collector hopper and deposits it near the center of a high speed mixing disk while water or other liquid is discharged at the center of the disk. It is claimed the speed and shape of the disk cause instantaneous mixing of the dust and liquid and the mixture flows

(*Continued on page* 84)



We'll get you the RIGHT *answer*

PRODUCTION MUST MARCH! The foundry industry is faced with the necessity of furnishing a continuously better product at the same price level or lower levels. If we can do this, we need not worry about losing our volume to other manufacturing processes.

★ ★ ★

Our job is cut out for us. You and we have got to keep improving the appearance of our castings. We must reduce variations in their weight. Scrap must likewise be cut. As quality goes up, costs must come down. There is no alternative. Excuses, pretexts, "alibis", are "out" . . . In typical instances SPO has helped foundrymen to lower molding costs as much as 50%, to decrease scrap in the same ratio, and to increase production per man as much as 150%.

Foundrymen have been kind enough to tell us that our background has aided in achieving these results. We are foundrymen by training and inclination. We made thousands of castings before we began to build molding equipment. We make them still—in your plant and ours—to prove our case. Customers welcome our willingness to *stay with* an installation until it performs exactly as we say it will. It is by this procedure that we are able to promise definite results and to fulfill every promise.

SPO now invites you to *use our plant as your laboratory, your experimental department, your testing ground.* Our facilities are adequate for the purpose. We believe, with the young man in the illustration above, that we will get you the *one right answer* to your problem.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators, and Patterns for Production

East 61st Street and Waterman Avenue · · Cleveland, Ohio

(*Continued from page* 82)

from the sludge discharge at the bottom of the unit.

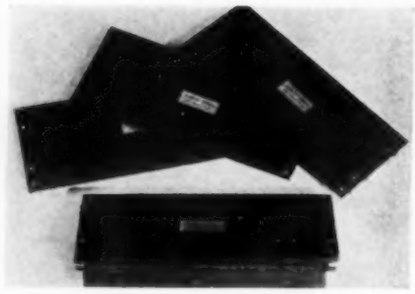
Relative amounts of dust and water constantly are under the control of the operator. In multiple hopper installation the unit preferably might be mounted on a truck where a quick coupling allows connection through a canvas spout. The disposal unit is equipped with a $1\frac{1}{2}$-horse power motor which drives the spinner disk through multiple *V*-belts. Spinner shaft is mounted in anti-friction bearings, entire unit is built for heavy duty and all parts are easily accessible for inspection and replacement.

Melting Unit

Johnson Gas Appliance Co., Cedar Rapids, Iowa, has placed on the market a new melting furnace, shown in the accompanying illustration. It is available in two sizes and is designed for melting aluminum and brass, and also may be employed for pot-hardening with salt, cyanide or lead bath. Furnaces are said to be ruggedly constructed with shields heavily lined with insulating refractory, and due to large combustion space below and around the pot, the flame does not impinge directly on it. Capacities are 10 pounds of aluminum or 35 pounds of brass, and 20 pounds of aluminum or 65 pounds of brass.

X-Ray Cassettes

St. John X-ray Service Inc., 20-20 Thomson street, Long Island City, N. Y., has developed a new type x-ray cassette shown at the bottom of the accompanying illustration. it is arranged so that the film, enclosed in a flexible film holder, is placed in the cassette, and removed after the photograph is taken. That eliminates handling the cassette to and from the darkroom. Another feature of the cassette is the interchangeable filter fronts which are



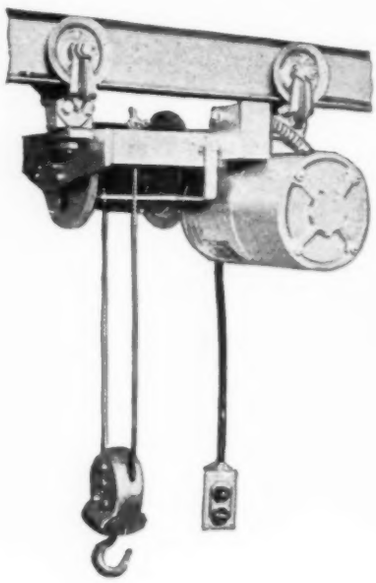
shown in the upper part of the illustration, and which may be attached to the cassette.

Printing Machine

Ozalid Corp., Johnson City, N. Y., has developed a new automatic high speed white print machine, shown in the accompanying illustration, which combines printing and developing in one compact unit. It is equipped with what is claimed to be a new light source which gives a printing speed up to 20 linear feet per minute. A variable transformer included in the primary circuit of the transformer permits variation of intensity of the lamp from full brilliancy to 60 per cent of maximum without loss of energy. This dimming arrangement allows the operator to select the intensity required and permits continuous and uniform production of whiteprints despite variations of tracings. A device automatically separates the original drawing from the print after exposure. The original is returned to the operator in the front of the machine and the exposed print is delivered to the dry developer. Thus either continuous yardage or cut sheets can be used to afford substantial savings where drawings conform to certain standard dimensions.

Aluminum Hoist

Electro Lift Co., 30 Church street New York, announces a new light weight, high speed, cable type electric hoist with all castings of aluminum alloy, as shown in the accompanying illustration. The hoist has been designed for the lightest possible weight consistent with the heavy duty service for which it may be used. It is especially suitable for applications requiring frequent moving and handling. Built in lifting sizes from $\frac{1}{8}$ to 3 tons, equipped with all the speeds and ratings of standard hoists, it may be equipped with traveling rope guides to eliminate hazard of crossed or piled up cables where loads are pulled at an angle from the vertical. A worm drive running on tapered roller bearings fully enclosed within the gear case, runs in an oil bath. Close head room permits the hook to come within short distance of the overhead track. Control may be either rope or push button type. Top and bottom limit switches also may be provided to stop the load in each direction of travel.



Molding Machine

Milwaukee Foundry Equipment Co., 3228 West Pierce street, Milwaukee, has introduced a power jolt squeeze pin stripper, shown in the accompanying illustration, which is similar to several other machines made by the company but has the additional advantage of being adaptable to a wider range of flask and pattern sizes. The new unit utilizes a revised construction of what normally would be a stripping frame to mount four upright pins in such

(*Concluded on page* 86)

Always THE MODERN METHOD OF NONFERROUS MELTING

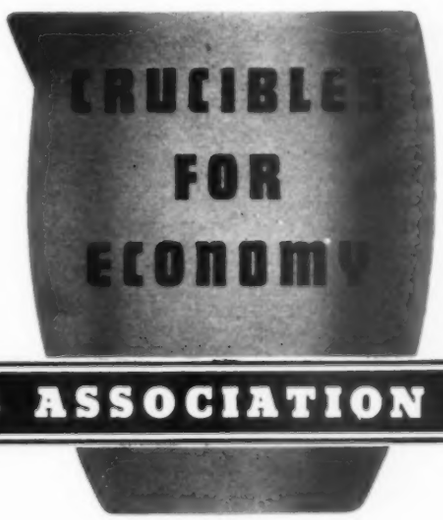
● Foundries now obliged to increase their capacity are adding crucible units. Foundries that are modernizing are replacing old style crucible furnaces as well as noncrucible melting equipment with modern crucible units.

The modern units are equipped with better burners to economize on fuel, insulation to conserve heat, and improved mechanical features which add to speed and ease of operation.

2200 Non-ferrous Foundries Use Crucible Furnaces.

Present interest in crucible melting is so great that there were three separate papers read at the A. F. A. convention dealing wholly or largely with crucible melting.

Ask any crucible user or crucible furnace manufacturer for information, or address:

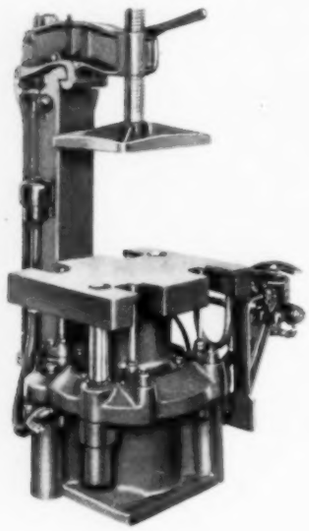


CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST STREET, NEW YORK, N. Y.

(*Concluded from page* 84)

fashion that they engage the flask edges. They are adjustable horizontally for quick adaptation to various flask widths and it is claimed



they eliminate the necessity for any type side rails or stripping plates.

A newly designed air dogging mechanism permits the conventional method of pattern drawing through retention of the flask and mold in an upper position directly after the squeeze stroke is completed and during the recession of the pattern table to the base position. Reversal of the action of the dogging mechanism allows operation of the unit as a straight pin lifting machine with pattern drawing accomplished through a carefully controlled lifting of the mold and flask upward from the pattern. Another claim is that in addition to the considerable elasticity offered through use of the adjustable pins the machine also permits the use of almost any type flat back pattern equipment, wood or metal.

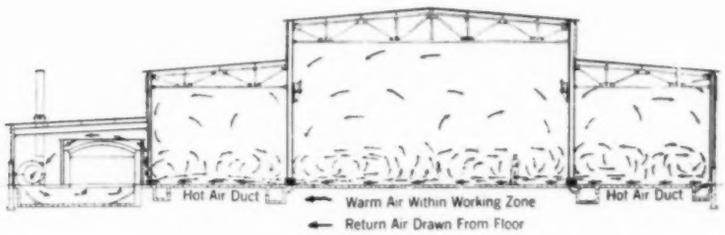
Control Valves

Foxboro Co., Foxboro, Mass., has developed a line of motor controlled valves designed for accurate response to demands of a control instrument. The valves may be used for control of oil or gas fuel lines to furnaces, control of steam lines, or for control of cooling water. The valves may be equipped with a wide range V-port plunger, a parabolic plug type and a wide ratio turned plug type. Body and plunger of the valves are designed for high lift to provide a wide range of flow characteristics.

Operation of the valve is provided by a floating power motor with suspended construction. A one piece bonnet and stuffing box assembly is used whereby the bonnet is joined to the valve body with a ground tongue and groove connection to provide proper alignment of body and bonnet. Plungers of the valves are provided with top and bottom guides of polished stainless steel with large surfaces to reduce wear. Spider construction of the guide supports is said to prevent deposit of sediment which might interfere with valve operation.

Plant Heating

Lee Engineering Co., Youngstown, O., has developed a system of direct warm air heating for industrial plants which is claimed to possess many advantages. The system employs a centrally located air heater



which consists of a combustion chamber, heat exchanger tubes, air circulating fan and induced draft fan; the two latter being on the same motor shaft. Air from the building or from outside, or any proportional mixture of the two, is forced through the heater tubes, and the warm air generated is distributed where desired through a duct system.

The accompanying illustration shows one arrangement of the heating system and air distribution. Advantages claimed include inexpensive installation, efficient fuel utilizaton, maintenance of warm air in working zone, quick response to heat demands without over shooting, and the provision of an air distributing system for use in combinaton with cooling or other air conditioning systems.

Welding

Universal Power Corp., 4300 Euclid avenue, Cleveland, is marketing a liquid material for use in metallic arc welding which is claimed to reduce spatter from 50 to 75 per cent. Other advantages claimed are reduction of slag cleaning time when coated electrodes are employed; noninterference with penetration, tensile strength or ductility; maintaining a more stable arc; reduces cleaning time of spatter; rust inhibiting properties; a good foundation for painting, and ease of application.

Air Heater

Westinghouse Electric & Mfg. Co., Mansfield, O., has introduced a new line of wall and floor mounted air heaters designed to solve heating problems for specific applications.

It is claimed the ease of installation and clean, steady, odorless heat makes these units particularly desirable for use in crane cabs, truck houses, valve houses, locomotive cabs, scale rooms and garages. They are designed for use with either a three-heat hand switch or a thermostat. Wall mounted heaters range from 25⅛ to 31¾ inches in length and from 10⅜ to 16⅞ inches high. They have a rating of 1000 to 4500 watts and operate on 115, 230 or 440 volts. Floor mounted heaters have approximately the same heating surface and the same wattage, but operate only on 115 or 230 volts.

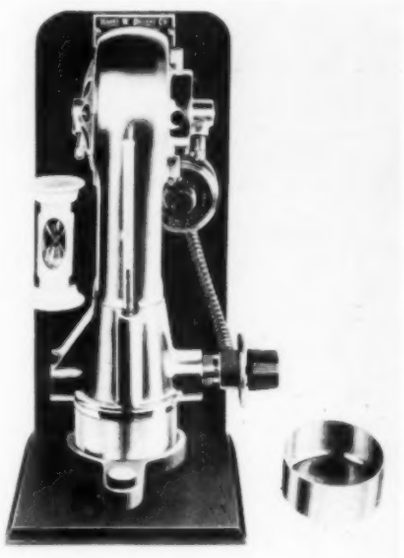
Chemical Cartridges

American Optical Co., Southbridge, Mass., has developed three new chemical cartridges, quickly and easily interchangeable with the standard type dust cartridge supplied for the respirator put on the market a year ago. The respirator now can be secured with a range of four protective filters, each providing highly efficient protection against type *A* dusts or nonlethal concentrations of certain fumes and vapors.

One of the new chemical cartridges is designed for use against low concentrations of fumes and gases encountered in paint spraying. A protective cover can be supplied to retard plugging when the respirator is used by a paint sprayer. The second cartridge can be used against low concentrations of acid gases, and the third against low concentrations of acid organic gases. All three cartridges are alike in construction and differ only in the filtering element.

Moisture Teller

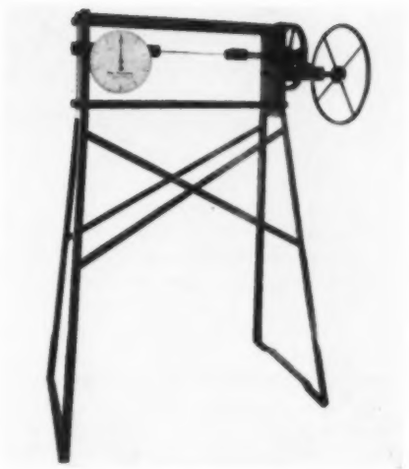
Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has announced the addition of a new size to a line of moisture tellers. The new device takes a sample pan 2¾ inches diameter and 1¼ inches in depth. Bottom of the sample pan is 500 mesh monel filter cloth. The pan containing the sample is placed under the heated air outlet. The moisture in the sample is flashed to steam and blown through the bottom of the pan. On many materials the sample is dried to constant weight in one minute. The light weight pan may



be weighed on a sensitive analytical balance for accurate moisture determination. Temperature of the drying air is controlled automatically by an adjustable thermostat.

Testing Machine

W. C. Dillon & Co., Inc., 3551 Sheffield avenue, Chicago, has developed a tensile strength testing machine for factory, high school, college, engineering and government laboratories where demand of the test does not go above 25,000 pounds. It is claimed that the machine is thoroughly dependable and provides accuracy and strength. Operation is so simple, the service of an expert is not required. Tension up to 5000 pounds can be developed with the pressure of a finger against the hand wheel. When a load is applied or decreased, the load remains stationary at any point when the operator's hand is removed from the hand wheel. The machine weighs less than 350 pounds, occupies small floor space, is of rugged construction throughout and is properly balanced. It is stated that machines



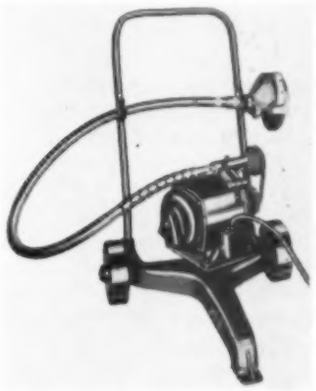
can be built to take longer pieces than shown in the illustration. Bench types also are available instead of the angle iron stand illustrated.

Belt Grinder

Porter-Cable Machine Co., 1714 North Salina street, Syracuse, N. Y., recently has placed on the market a new heavy duty belt grinder equipped for dry or wet grinding. The new grinder has a variety of speeds from 2400 to 6000 feet per minute. The machine also may be employed for squaring, cleaning, burring, facing, polishing operations, for removing gates and flashings. An exceptionally long belt is used, 9 feet in circumference. It is claimed this reduces heat and gives more economical service. Belt width is 8 or 9 inches. Model shown in the accompanying illustration is built for heavy duty with large pulleys and heavy duty special sealed bearings. Sturdy construction throughout includes the belt tensioning unit.

Flexible Shaft

Stow Mfg. Co., Binghampton, N. Y., has added a new truck mounted unit to an extensive line of flexible shaft machines. The new machine, shown in the accompanying illustration, designed for easy portability around factory floor or yard, makes use of a two wheel truck mount which carries either the direct connected motor and shaft unit or the multispeed belt and pulley drive unit. The heavy cast iron truck base carries two 8-inch wheels and an extension leg to insure three point stability, even on rough sur-



faces. Through a ball bearing swivel the units, light or heavy, easily may be turned to a horizontal plane. It is claimed the new model is particularly suitable for heavy work.

Grinding Disks

Abrasive Products Inc., South Braintree, Mass., recently has placed on the market a new type, paper backed, coated abrasive disk for application in grinding and polishing. The abrasive coating is attached to the paper back with a new binder developed by the firm which is said to possess unusual heat resistance. It is claimed that the binder stays firm and holds the grit in cutting position at temperatures up to 1800 degrees Fahr. The abrasive coating is comprised of a special aluminum oxide grit possessing a long life.

Storage Battery

Storage Battery division of Thomas A. Edison, Inc., West Orange, N. J., recently announced a new steel alkaline storage battery cell which it is claimed provides 33 1/3 per cent more electrical energy without any increase in floor space, a feature especially useful for installation where floor space must be conserved.

ADVERTISING PAGES REMOVED

Obituary

JAMES F. LEITCH, president, Ferro Machine & Foundry Co., Cleveland, died June 30 at his home in Cleveland Heights, O. He was born in Detroit and moved to Marine City, Mich. In 1895 Mr. Leitch came to Cleveland, and started with Oglebay, Norton & Co. as a checker of fleet movements. In 1907 he was appointed secretary-treasurer of the Ferro Machine & Foundry Co., a subsidiary of Oglebay, Norton & Co. and in 1920 Mr. Leitch became president.

* * *

J. D. Leary, vice president, Cincinnati Steel Castings Co., Cincinnati, died July 11 at his home.

* * *

Herman Mende, general superintendent of plants, S. Obermayer Co., Chicago, died June 17.

* * *

Edgar L. Mitchell, first salesman for the Beardsley & Piper Co., Chicago, and formerly foundry superintendent, died recently. Mr. Mitchell was born in Newton, Pa., but lived many years in Baltimore, Md.

* * *

John B. Stayne, 73, superintendent for 20 years of the Wellman Bronze Co., now the Wellman Bronze & Aluminum Co., Cleveland, died June 12 in that city. Mr. Stayne, a Canadian, went to Cleveland from Detroit many years ago. He was widely known in the foundry field before illness forced his retirement.

* * *

Henry Bond, 54, secretary-treasurer, Ross-Meehan Foundries, Chattanooga, Tenn., died June 6 after a long illness. Mr. Bond joined the Ross-Meehan company in 1919 as auditor and was promoted to assistant secretary-treasurer, and then in 1925, to secretary-treasurer, in which position he remained until death.

* * *

John Walton, 80, head of the shipping department of the Madison Foundry Co., Cleveland, for 28 years before his retirement in 1928, died recently in that city. Mr. Walton was born in County Mayo, Ireland, and went to Cleveland 60 years ago. He is the father of George Walton, vice president and secretary of the Madison foundry.

* * *

Louis E. Murphy, 66, formerly president and chairman of the board, E. F. Houghton & Co., Philadelphia, died June 26 at his summer home at Mantalocking, N. J., following a short illness. Mr. Murphy had been connected with the Houghton organization for 52 years, having started as an errand boy in 1888. He was elected secretary of the company in 1910, vice president in 1914, and president in 1929. He became chairman of the board in 1934.

* * *

Homer M. Silver, aged 78, president, Quaker City Foundry, Inc., Salem, O., died recently at his home. Mr. Silver was a lifelong resident of Salem, and was active in various phases of civic life. He was born June 16, 1862 and attended the Salem schools. He then became connected with the old Silver & Deming Co. and later was made foundry foreman. When that company reorganized as the Silver Mfg. Co., Mr. Silver was named superintendent. Later he became vice president serving in that capacity until 1927 when he organized the Quaker City foundry. He has been president of the organization since that time.

* * *

Dudley Willcox, treasurer and assistant general manager, Ajax Electrothermic Corp., Trenton, N. J., died June 14 at Princeton, N. J. hospital. His death follows by six weeks that of Dr. Edwin F. Northrup, vice president of the firm. Mr. Willcox was born in Lowell, Mass., July 21, 1886, attended Lawrenceville academy and graduated from Yale in 1908. From 1908 to 1914 he was associated with Tabor Mfg. Co. representing that company in Europe during 1911-1912. In 1916 he completed a graduate course at Princeton university being awarded the degree of electrical engineering. At Princeton he met Dr. Northrup and with him and others organized the Pyroelectric Instrument Co. and was treasurer when the company was succeeded by the Ajax Electrothermic Corp. He became its first secretary and sales manager in 1920 and later treasurer and assistant general manager. Mr. Willcox recently was elected president of the Trenton Rotary club and was prominent in civic and religious activities.

* * *

George A. Hetzler, 81, dean of Rochester foundrymen and widely known throughout the industry, died at his home in that city June 21 after an illness of 4 months. For many years he was president and treasurer of Hetzler Foundries, Inc., formerly Northwest Foundries, in which his son Herman G. Hetzler is secretary and general manager. He was born in 1859 and started his apprenticeship at the age of 15 in the old Co-operative Foundry. At the age of 18 he rode horseback from Rochester to Sacramento, California, where an uncle had mining interests. For a time he worked in a foundry near the foot of Market street, San Francisco. Returning to Rochester he became a molder at the plant of the Sill Stove Works Corp. Later he was appointed foreman and superintendent. In 1912 he commenced making experimental castings for Edward A. Halbleib, now a managing director, General Motors Co. It is claimed he was the first man to cast an aluminum match plate in the city of Rochester. By 1915 he was casting 6 tons of aluminum per week in a new concrete building. The plant was sold and the company switched over to the production of iron, brass, bronze and aluminum castings. Later the plant was enlarged by four additions. Mr. Hetzler made castings for some of the first airplane motors and for some of the first starter and lighting systems on automobiles.

Adventures of Bill

(*Concluded from page* 52)

side and end walls of the mold. After they are in place on the bed, the center joint should be calked to prevent the metal from seeping down and getting under the cores. From this distance I should say you had the job well in hand.

"A final wire brought up a new point: 'Should risers be churned with rods? Have only six molders.' To which I replied 'No rod feeding necessary. Cover with blacking and add a little hot metal from hand shank.'"

"And that," I said, "is the end of the story of Johnny McGorry with the little red stockings! Remember the old rhyme "I'll tell you a story about Johnny McGorry and now my story's begun. I'll tell you another about Johnny's brother and now my story is done!' What about this long distance friend of yours? Did he ever let you know whether or not he had made the castings, and if he had were they any good?"

"You want the happy ending, the final clinch and the fade away? Listen to this. One of the few authentic instances on record where the party of the second part admits that he derived a bit of good from the advice and opinion of a party of a first part: 'We have shipped the two boring mill tables. They turned out O.K. With the limited number of men on hand the feeding of the castings had me up a tree. I never had used large, self feeding risers. They worked to perfection. No shrink of any kind. The castings came out nice and straight.'"

Booklet, "Educational Orders for Peace-Time Munitions Production," by Harold V. Coes, Ford, Bacon & Davis, Inc., has been issued by the American Management association, 330 West Forty-second street, New York. Copies may be secured from the association for 25 cents.

Foundry Activities

FOUNDRY Equipment Manufacturers' association, 1213 West Third street, Cleveland, recently has made a change in the base for determining the index of sales. The 1922-23-24 base, which has been in use for a number of years, has been replaced by a base which gives the average for 1937-38-39 as 100 per cent.

According to the new base, total sales for May, 1940 was 129.1 compared with 145.2 in April. Comparison with the figures secured on the former base may be provided by multiplying the new base figure by 1.328.

* * *

Messmer Brass Co., 2700 South Seventh street, St. Louis, is building an addition to its plant.

* * *

Sparta Foundry Co., Sparta, Mich., has let general contract to Earl H. Beckering, Grand Rapids, Mich., for a plant addition.

* * *

McKinnon Industries Ltd., Ontario street, St. Catherines, Ont., is building a foundry addition of 6500 square feet.

* * *

Modern Pattern Co., Minneapolis, is building a one-story factory addition. Ralph C. Hitchcock is president.

* * *

Saginaw Malleable Iron division of General Motors Corp., Saginaw, Mich. has constructed a $15,000 addition to its annealing department.

* * *

Modern Pattern & Foundry Co., Los Angeles, is erecting a new pattern shop on Magnolia street near Slauson avenue, to cost $3020.

* * *

Antioch Foundry, Yellow Springs, O., plans a new plant in or near that town, funds being pledged by business men. Morris Bean is manager.

* * *

Pyott Foundry & Machine Co., 328 North Sangamon street, Chicago, had materials and equipment damaged by fire on July 12 to the extent of $25,000.

* * *

Hill Clutch Machine & Foundry Co. and Acme Machinery Co., Cleveland, recently were merged, uniting two heavy equipment manufacturers in business nearly 60 years. Name of the combined companies will be Hill, Acme Co. A. C. Daniel is president.

* * *

Price-Evans Iron Works, Inc., Anderson avenue and Belt railroad, Chattanooga, Tenn., has discontinued its foundry and will sell the property. L. E. Taylor is manager.

* * *

Johnson Bronze Co. Inc., New Castle, Pa., is constructing a new building 100 x 1000 feet to expand its operations and facilities in response to increasing demands from automotive and airplane fields, P. J. Flaherty, president of the organization, has announced.

* * *

New equipment valued at more than $2500 has been installed in the foundry of the college of engineering, Cornell university, Ithaca, N. Y. This is a further step in the process of complete modernizing of the foundry, a concrete floor having been laid several weeks ago. The two new machines are gifts from the Herman Pneumatic Machine Co. of Zelienople, Pa. Thomas Kaveny, '94, president of the company, and his two sons, Thomas Jr., '26 and Robert '29, who are active in the management, all attended the college. The larger unit is a stationary jarring roll-over patterndrawing machine. The smaller unit is a portable jar and squeeze molding machine.

* * *

A. G. Heilman formerly connected with the Meech Avenue Foundry, Cleveland, has organized the Tiffin Gray Iron & Semi-Steel Co., Tiffin, O., and is building and equipping a foundry in that town for the production of a miscellaneous line of gray iron, semisteel and alloy iron castings. According to present plans the plant will be in operation about Aug. 1.

* * *

Ownership of the Wm. E. Pratt Mfg. Co., Joliet, Ill., recently was transferred to the Joslyn Mfg. & Supply Co., 20 North Wacker drive, Chicago, through the purchase of capital stock. The Wm. E. Pratt Mfg. Co. will continue to operate under its original name, with the following new officers: F. E. Clark, president and general manager; W. E. Manthey, vice president; B. S. Handwork, vice president; A. J. Blaeser, vice president; P. R. Pennington, secretary and treasurer. Messrs. Handwork, Blaeser and Pennington are of the Joslyn Mfg. & Supply Co.

* * *

Muskegon Piston Ring Co., Muskegon division, Muskegon, Mich., has built a second story addition to its factory which will house the engineering and research departments and permit the carrying on of development work in both metallurgy and engineering, in connection with piston rings. In that department the company will continue its wear testing research and microscopic investigation of metal structures and metal finishes. The company also has built a 30 x 40 foot addition to its test house which will provide an office for the dynamometer engineer and also facilities for servicing fleet test vehicles. The department is equipped with four dynamometer stands for automotive engine testing, and with all suitable instruments for indicating engine temperature condition, etc., during the test period.

RAW MATERIAL PRICES
July 16, 1940

Iron	
No. 2 foundry, Valley	$23.00
No. 2 Southern Birmingham	19.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Buffalo	23.00
Basic, Buffalo	22.00
Basic, Valley	22.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$5.75 to $6.30
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.00
Scrap	
Heavy melting steel, Valley, No. 2	$17.50 to $18.00
Heavy melting steel, Pittsburgh, No. 2	18.00 to 18.50
Heavy melting steel, Chicago, Auto No. 2	15.00 to 15.50
Stove plate, Buffalo	15.50 to 16.00
Stove plate, Chicago	12.00 to 12.50
No. 1 cast, mchy., New York	17.00 to 17.50
No. 1 cast, mchy., Chicago	17.00 to 17.50
No. 1 cast, Pittsburgh	20.00 to 20.50
No. 1 cast, Philadelphia	21.50 to 22.00
No. 1 cast, Birmingham	15.50
Car wheels, iron, Pittsburgh	20.00 to 20.50
Car wheels, iron, Chicago	18.50 to 19.00
Railroad malleable, Chicago	21.50 to 22.00
Malleable, Buffalo	22.50 to 23.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	10.50
Straits tin	51.00
Aluminum, 99 per cent	19.00
Aluminum, No. 12 (Secondary, standard)	14.25 to 14.75
Lead, New York	5.00
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill	6.25

INVESTIGATES SAND COOLING

(*Concluded from page* 35)

the moisture deficiency after shakeout.

When a sand system behaves in that manner, the only remedy is to add more moisture to the hot returning sand. This may be accomplished most easily by allowing more green sand to overflow onto the hot sand return belt, where it combines with the shakeout sand and furnishes the necessary moisture for evaporation (cooling). Of course, moisture or water may be added directly to hot sand on the return belt, but this is a very messy process and likely to cause much trouble.

Considering the virtue of moisture evaporation for the cooling of molding sand, it may be stated that if it were not for the fact that evaporation of moisture always is at work in the foundry, it would be impossible to operate mechanized foundries in the modern manner.

To take full advantage of evaporation, or in other words, cool the sand to a good working temperature (10 degrees Fahr. above room temperature) some means must be provided for opening the sand so that the vapor (steam) may escape. Also, some means of removing this vapor from the sand should be provided.

In a typical exhausted barrel, shown in Fig. 4 and first installed in a sand conditioning system as a lump-breaker and revolving screen, it was noted that under operating conditions the drum became very hot. The head at the entrance end was removed and an exhaust applied as shown. A temperature drop of 85 to 90 degrees Fahr. was noted through this equipment.

Allows Escape of Hot Vapor

This device agitates and separates the sand particles, allowing the hot vapor to escape. In exhausting this equipment, good practice requires about 2 cubic feet of air per pound per minute through the barrel. Hot moist sand travelling on belts or held in bins loses temperature slowly when its temperature is 212 degrees Fahr. or lower. The vapor pressure in the sand is less than atmospheric pressure and therefore is held in the sand.

Various operating conditions affect the proper functioning of the cooling barrel. A list of these factors follow in the order of their importance.

1. Insufficient moisture in molding sand after shakeout.
2. Very low sand to casting ratio (less than 4 to 1).
3. Molding sand with very low moisture content, as tempered (less than 4 per cent).
4. Excessively long mold conveyors, causing too much heat to be absorbed by the mold.

Any of these factors may be overcome by adding moisture after shakeout. If the shakeout temperature of the sand is known the amount of moisture required may be calculated with reasonable accuracy by the following formula:

$$\text{Moisture} = \frac{(ST-80) \times 0.195 \times \text{weight of sand}}{1101}$$

where ST is the shakeout temperature; 0.195 is the specific heat of sand; and 1101 B.t.u. is the heat required to raise and evaporate one pound of moisture from and at 212 degrees Fahr. under usual foundry conditions.

It may be well to add that when the moisture is removed before the sand enters the primary storage bin, no trouble, such as bridging and sweating bins will develop. Also the cool sand in feeder bins is less likely to bridge.

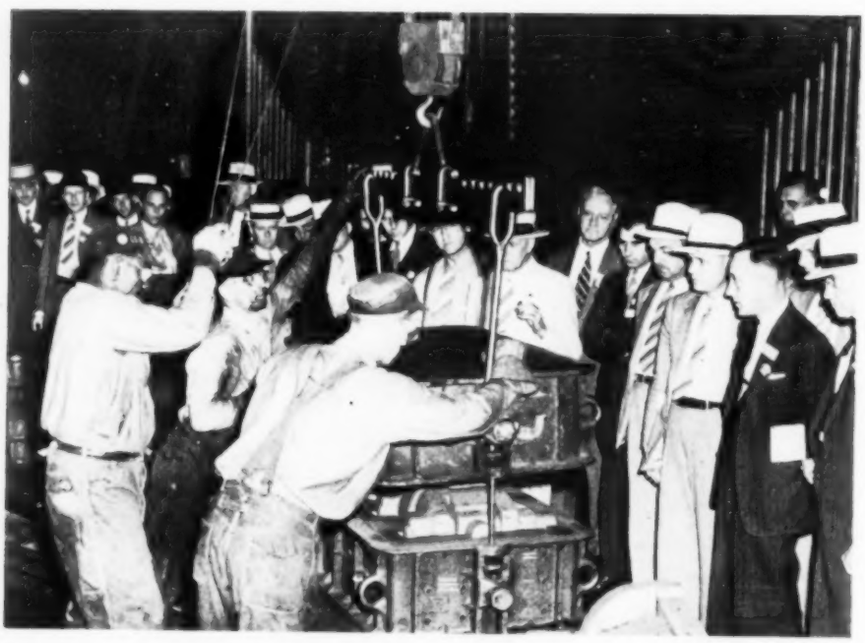
Continuous foundries sometimes produce large volumes of relatively small castings (20 pounds or less) and it is desired to cool these castings quickly. When these castings are shaken out at 1500 degrees Fahr. Fig. 1 shows that the heat dissipated to cool to 200 degrees Fahr. is 190 B.t.u. per pound.

Fig. 2 shows the rate of cooling under these conditions.

These mills usually are about 40 feet long and from 36 to 48 inches in diameter. They are open on both ends and exhausted from the center, making a parallel flow from entrance to center and a counter-flow from center to exit end. The rate of heat exchange between castings and exhaust air sometimes is very poor. Fig. 3 shows at *A* temperature raise for various volumes of 70 degrees air at rates of iron flow from 4000 to 10,000 pounds per hour. Fig. 3 shows at *B* the necessary brake horsepower for various volumes using a typical foundry dust collector.

Important point is that the most economical operation is with the lowest volume and the greatest temperature raise of the exhaust air. However, sometimes it is necessary to use more air because of the low rate of heat exchange and quite often it is found that the desired temperature drop of the iron cannot be secured.

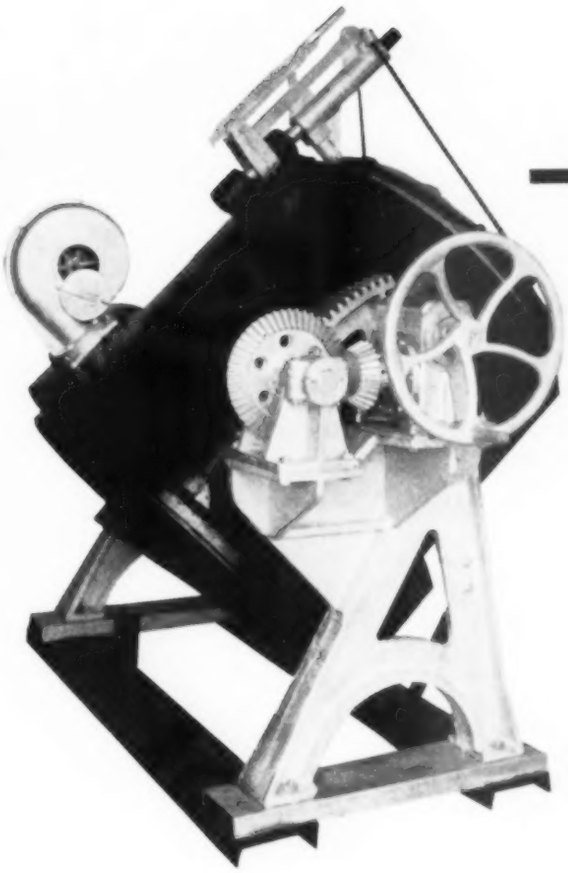
Engineers Inspect Milwaukee Foundry



GROUP of engineers watching molding operations on the continuous casting unit of the Allis-Chalmers Mfg. Co. foundry during a recent plant inspection of the A.S.M.E.

Annual conference of the National Industrial Advertisers association will be held at the Hotel Statler, Detroit, Sept. 18 to 20.

WHY . . .



have the following firms recently put in units of the WALKER-YORK Hot Blast, Coke-Fired furnace?

The answer is yours for the asking.

Aulson Tanning Machinery Co., Salem, Mass.
Boston Pattern Works, Jamaica Plain, Mass.
Commercial Foundry Co., New Britain, Conn.
General Bronze Corporation, Long Island City, N. Y.
Hale Fire Pump Co., Conshohocken, Penna.
La-Del Conveyor & Mfg. Co., New Philadelphia, Ohio
National Bearing Metals Corp., Portsmouth, Virginia
Northern Bronze Corp., Philadelphia, Penna.
Norwalk Lock Co., South Norwalk, Conn.
Schaible Foundry & Brass Works Co., Cincinnati, Ohio
Slaymaker Lock Co., Lancaster, Penna.
Strickland Machine Co., Richmond, Virginia
Temple Foundry, Alexandria, Virginia
Walker Machine & Foundry Corp., Roanoke, Virginia
Waterville Iron Works, Waterville, Maine
White Bros. Smelting Corp., Philadelphia, Penna.

CRUCIBLE FURNACE COMPANY

CHARLOTTESVILLE, VA.

PRACTICE AFFECTS YIELD

(*Continued from page* 29)

and simple way of increasing the temporary permeability of the molding sand. Except in limited instances, steel molders—especially those working on dry sand—seldom vent their molds. It would aid the yield to a great extent if venting the molds were practiced more than as at present. Wisely placed vents bring their reward in the shape of better quality castings with fewer surface defects disclosed after machining.

This condition may be noted from time to time on castings returned for repairs or replacement. These castings machine up defective with hidden gas pockets under the surface that cannot be detected before shipment is made. The vent may not be a cure, but it is an acknowledged aid. There are instances where venting could eliminate certain heads or aid in the reduction of head size. Vents in the cores require attention during the making of the core and after the core has been dried. Inspection ensures that the vent is open and able to serve the purpose for which it was intended. Wherever possible, all vents should be made as part of the equipment and a permanent part of the core box or pattern.

Of equal importance to proper venting all molds and cores is the sand from which cores are made. This demands the attention of each core room foreman. Core sands are mixed to a standard permeability. An oil sand or a sawdust mixture of sand has a high permeability. These core sands assure an openness that aids in drying the core and in venting more uniformly than could be done by depending on a vent wire in an improper or less permeable core sand mixture.

Chills Control Shrinkage

External and internal chills, if used wisely help control shrinkage and assist in increasing the yield. They must be of a relative size to the section to be chilled, and they must be clean, dry and free from all foreign matter. Their object is to help eliminate cracks, reduce heads or head sizes at certain points, and to reduce brackets. They have a very important duty to perform and are entitled to every measure of attention to ensure that they are in the best of condition. To use a poorly conditioned chill with the intention of eliminating a crack or riser and then have the metal blow from the chill is only substituting one evil for another.

The sand reclaiming and milling department assist by supplying properly mixed facing and backing sands, checking the moisture content, testing the permeability of the sands, and reporting immediately on the materials in the facings when they fail to meet the specifications desired. Blown, scabby or dirty castings result when the sands are not up to standard. The scrap is thereby increased with consequent reduction in yield. Sand is a very important factor in the final results.

Approximately 11 per cent by weight of all metal that enters a plant is lost. The loss takes place between the charging of the furnace and the casting of the molds and is exclusive of scrap castings or skulls and spills which are reclaimed with the exception of a 2 per cent loss. The remainder is lost in melting. It readily can be seen that these losses, if not fully checked and controlled, can affect yield to a very great extent.

To prevent and avoid spills, close co-operation between the open hearth and foundry departments is necessary in the ordering of heats. Hot heats from the open hearth poured without lost time assure limited sized skulls and prevent misrun castings.

Accurate weighing of the charges gives the foundry better control of the pouring amounts from each ladle, and also assures the cost department of a better check on stock figures upon which to base the standards designating the melting, skull and spill losses. Importance of close co-operation between the two departments cannot be overestimated.

Casting Depends on Pattern

Leaving aside the question of design, in which foundry opinion should be sought, but very often is not, the first point to be considered is the making of the pattern. A great deal of the ultimate success of the casting depends on the way in which the pattern is made.

Often the foundry is supplied with a pattern made without consultation and by a patternmaker who has had no experience of the particular metal demanded, or the materials to be used in making the molds. The closest co-operation between the patternmaking and molding department is called for on all jobs. False economy in stinting the cost of patterns, involving the foundry in a risky position or method of molding, are familiar to most foundry executives as regular oc-

(*Concluded on page* 96)

Provides Instruction on Shop Problems

GREENLEE FOUNDRY CO., Chicago, manufacturers of meehanite castings, recently inaugurated a voluntary instruction course for molders and helpers meeting twice monthly. One of the groups in session is shown in the illustration. Problems involving sand, shop scrap, and defective castings are discussed and slow motion pictures of iron being poured into molds have been shown. Attendance averages between 40 and 50 and the company reports very favorable results in improved attitude and workmanship.

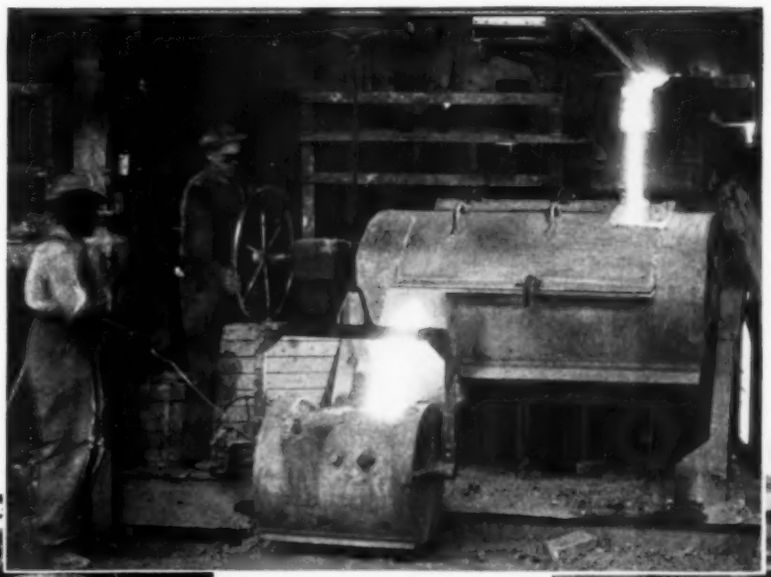
Use MODERN METAL HANDLING SYSTEMS

MODERN
Mixing Ladles

Modern 3000 lb. Mixing Ladle delivering metal into a 1000 lb. Modern Cylindrical distributing ladle in a stove foundry. Absolute uniformity of metal has resulted.

MODERN
Electric Pouring Devices

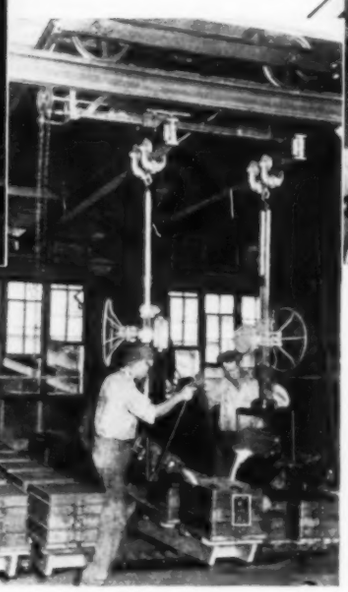
with 1200 lb. Cylindrical Ladles



For More Profits in 1940.

Modern pioneered Covered and Insulated Ladles give you new temperature pouring control.

Mfgd. under USA Patents 1703231, 1816185, 2073150, 2079765, 2122032, 2100713, 2134785, others applied for.



Modern one ton Covered and Insulated Ladle above. Metal is held in this ladle 30 to 45 minutes regularly.

Modern One-man Pouring Devices simplify pouring of heavy floors and eliminate much hard disagreeable labor.

Catalogues on Request

MODERN EQUIPMENT COMPANY

PORT WASHINGTON, WIS., DEPT. 170

MODERN

Covered and Insulated Ladles
Lifetime Geared Ladles
Improved Bottom-Pour Ladles
Metal Pouring Systems
Crane and Monorail Systems for Metal and Mold Handling
Furnace Charging Cranes
Sand Conditioning Systems
Cupola Chargers

MODERN EQUIPMENT CO.

(*Concluded from page* 94)

currences. In repetition work, these factors are not encountered. The quantity required and the ultimate value demands spending on proper pattern equipment. Security and lack of variation, give a more than adequate return.

Large quantities of steel castings have to be made which cannot be described as being of a repetition character. Yet very often an even higher standard is demanded from these jobbing castings than from repetition ones. Consider for example high pressure steam castings or castings of similar type.

Accuracy of shape, perfect soundness, exact placing of all cores are items of importance, and yet design may alter considerably from order to order. When the significance of all these points is realized one would imagine that patterns for these parts would be of the very best, designed to mold and core up as the result of the combined thought between the pattern builder and the foundry foreman. Too often the molder is supplied with a pattern and core box so designed that owing to difficulty in withdrawing the pattern or insertion of cores, he is obliged to mold in a position not entirely favorable to the production of a perfect job.

Surely the first and most important factor is that the design and type of pattern shall be the result of close co-operation between the pattern shop and foundry and that the ultimate casting, both from quality and cost of production points of view, shall be the primary consideration. By this means one or more of the possible variables may be reduced in number of occurrences and more regular castings will be produced.

Study Pattern Equipment

Now that competition has forced the demand upon the manufacturers for *The Perfect Casting* and the ambition of the organization is to produce this casting despite the unexpected variations that occur in production, would it not be advisable to make as part of the pattern equipment, all pads and gates on jobs that warrant these additions? Castings could start from the foundry toward the cleaning room with the benefit of properly sized gates and heads and pads.

Inspection and cleaning departments influence yield to a certain extent. Lost castings, although later recovered and placed in stock, reduce the yield as castings scrapped and unreported do likewise. Complete control of weights of all castings and accurate weighing of all shipments has a direct bearing on yield.

The foregoing brief outline shows the direct influences and practices that have control over the yield of a steel foundry. The next step is to examine why control of the yield feature is so necessary.

High or low yields exercise main control over production costs, due to the materials and labor costs saved or spent. Comparison may be made to a spider on its web where a point up or down sways all connections accordingly. Costs rise or fall with the yield since all materials and all labor costs are based on what passes over the scales.

As a sales department is governed to a great extent by the estimated costs supplied by the estimating or cost departments, and since the estimates supplied are based upon previous costs, the greatest care must be taken in supplying these estimates which in turn are based on the yields. If the estimated yield is not in accordance with the actual yield but should run lower than estimated, that particular estimate will show either a reduction in profit or an actual loss.

Start From Conservative Point

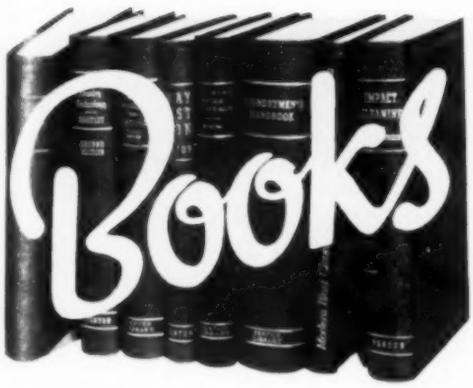
Should the actual yield run higher than the estimate, the producer is placed between two uncertain possibilities. One is that the sales department has been obliged to quote a figure that is not representative of the practice at the plant. The second is that the casting may turn out defective, and require welding, followed by back charges or possible rejection. Here again the profits are reduced. The next best step is to avoid if possible all hazards by starting from a conservative angle, after a careful study.

In the final analysis, the manufacturing of steel castings presents a problem requiring technique, tact, ability and above all good common sense, most profitably applied in an organization made up of individuals who know each others problems, and who work together closely and harmoniously. Success as applied to the steel foundry is a combination of net profits earned and the permanent growth or expansion of the organization. Permanent profits are possible only, if the conduct of business is based on sound business policies, the prime requisites of which are satisfied customers, contented employes and a reasonable margin between the cost and selling price of good steel castings.

Cast Tunnel Rings Cleaned with Brushes

THE huge cast iron rings that form the new Queens midtown tunnel under the East river at New York are 30 feet in diameter and weigh 3200 pounds each. Grooves between the rings were caulked with lead to make the tunnel waterproof. Before caulking, wire wheel brushes 6 inches in diameter mounted on portable tools were used to remove rust, mud and wax coating from the grooves. Illustration courtesy the Osborn Mfg. Co., Cleveland.

Metal Industry Publishing Co., 116 John street, New York, just has published its 1940 *Plating and Finishing Guidebook*. It contains 206 pages and is divided into 14 sections written by various authors on subjects relating to the plating and finishing fields including topics as plating equipment, metal surface preparation, plating solutions, metal coloring, testing and control, etc.



FOR MODERN FOUNDRYMEN

■ Modern foundry management and practice requires that foundrymen be "on their toes" to meet the demands of industry . . . The PENTON BOOKSHELF of instructive and informative books on all phases of foundry management and practice will help you as it has already helped thousands of other foundrymen. Select those volumes that you need now and order copies today . . . post this advertisement on your bulletin board for the convenience and information of your co-workers. A study of the pages of these books will almost immediately lead to improved efficiency and practice in your shop.

TALES FROM THE GANGWAY

450 pages, 59 chapters, $1 postpaid. This book is a collection of the early chapters of Pat Dwyer's rollicking foundrymen, told in an exceedingly readable style. As practical as it is readable, this book tells the foundryman many practical things, including: the making of gears, open sand plates, sheave wheels, large pots, blast furnace coolers, winding or hoist drums, patterns, stand pipe connections, long columns; core-making, etc. Originally sold for $3, this book is filled from cover to cover with down-to-earth, practical suggestions. If there is a foundryman who does not already have this book he is missing one of the most readable and usable books ever written.

ELEMENTARY FOUNDRY TECHNOLOGY

Second Edition, 377 pages, 132 illustrations, $3 postpaid. This book is an excellent book of instruction for apprentices, young men studying the foundry trade and for reference use of practical foundrymen. Included, in addition to elementary chemical and physical data, are discussions of; effects of elements on iron; iron manufacture; elementary problems in steel foundry production; brass melting, foundry sands, molding machines; and gates and risers.

MODERN BLAST CLEANING AND VENTILATION

213 pages, 38 illustrations, $4 postpaid. This book, by C. A. Reams, engineer of Ford Motor Co., brings latest and most approved methods of casting cleaning to foundrymen in plain language. It is full of completely practical suggestions and proved methods and practices. Application of cleaning methods discussed will eliminate many objectionable cleaning room practices. Full information on abrasive selection and use is included. Practical foundrymen report this book worth many times its cost.

GRAY CAST IRON

383 pages, completely illustrated, $5 postpaid. John W. Bolton, recognized foundry authority has collected and compiled in readable form all recent information on this subject, so presented that it is extremely usable. Includes latest information on structural metallurgy; engineering and physical properties, melting processes; casting defects; effects of regular and alloying elements; superheating; heat treatment; machinability and wear; effect of temperature on mechanical properties; corrosion, and specifications. This book is a "must" in every progressive gray iron foundry.

FOUNDRYMEN'S HANDBOOK

310 pages, fully illustrated, $3 postpaid. This book, reduced from $6 because some specifications are now out of date, has long been a standard reference book among foundrymen. It is a complete compendium and handbook covering every branch of foundry work from estimating the price to cleaning finished castings. If you do not already own a copy of "Foundrymen's Handbook" your working tools are incomplete.

IMPACT CLEANING

480 pages, 256 illustrations, $7 postpaid. Wm. A. Rosenberger is a recognized impact-cleaning engineer who has gathered together all important information on the subject and presented it in readily understood form. Every foundryman knows that cleaning costs can eat up profits. This book shows both theoretical and practical ways to reduce cleaning costs to a minimum. It presents the "how and why" of high cleaning costs and shows exactly the methods to be used in their reduction. No foundryman responsible for either quality production or satisfactory earnings should be without this book.

GATES AND RISERS FOR CASTINGS

373 pages, fully illustrated, $3 postpaid. This is a practical book covering completely and with authority a subject never before covered in book form. It is an encyclopedia of sound foundry practice supplying reliable answers to the ever present question, "How can casting defects be prevented?" Written for every foundryman from workman to owner.

For convenience in ordering, use the coupon below . . . be sure to check all the books you want.

REFINING METALS ELECTRICALLY

414 pages, 55 illustrations and 50 tables, $2 postpaid. This book, reduced from $6, covers the theory and practice of melting in the electric furnace. Gives helpful data on size selection, type to use, economy in operation, advantages and limitations, installation, maintenance, etc. A fully practical book in which history and background are presented to provide the reader with all data necessary in installation, operation and maintenance.

MELTING IRON IN THE CUPOLA

240 pages, 126 illustrations, $2 postpaid. This book formerly sold for $5. Covers practically every phase of cupola construction, operation and maintenance. A thoroughly practical book. Suitable for the novice studying the cupola as well as the practical foundryman who operates it. Tables, formulas and a complete cross-index listing more than one thousand items makes this a valuable reference and practical work book.

THE FOUNDRY, Book Department,
1213 W. Third St., Cleveland, Ohio

Enclosed is $..... * ☐Check; ☐Money Order; ☐ Company Order; for the following books I have checked.

- ☐ **"Elementary Foundry Technology," @ $3 postpaid**
- ☐ **"Gates and Risers for Castings," @ $3 postpaid**
- ☐ **"Gray Cast Iron," @ $5 postpaid**
- ☐ **"Modern Blast Cleaning and Ventilation," @ $4 postpaid**
- ☐ **"Impact Cleaning," @ $7 postpaid**
- ☐ **"Foundrymen's Handbook," @ $3 postpaid**
- ☐ **"Melting Iron in the Cupola," @ $2 postpaid**
- ☐ **"Refining Metals Electrically," @ $2 postpaid**
- ☐ **"Tales from the Gangway," @ $1 postpaid**

NAME .....

ADDRESS .....

CITY ..... STATE .....

*Orders for delivery in Ohio must be accompanied by 3% additional to cover compulsory state sales tax.

CLEANLINESS FEATURES SHOP

(*Continued from page* 26)

provided with a trunnion on each side for engagement of the bail suspended from a light chain hoist as shown in Fig. 1. A helper manipulates the hoist while the expert pourer directs the metal into the sprues. He grasps the handle of the tongs in one hand and holds a small skimmer over the surface of the metal in the crucible with the other hand.

The main line of the monorail is mounted above the side gangway in the foundry and extends into the furnace room where it turns at a 90 degree angle and extends to the far end of this department directly above the center line of the battery of furnaces. Through a suitable switch at each junction the hoist leaving the furnace room and carrying the crucible, can be transferred to any one of the branch monorails extending to the far wall over each molding floor. Special shaped tongs, shown at the center background Fig. 5, are employed for lifting the crucibles from the furnaces. The long jaws of the tongs are curved and shaped to engage the crucible closely.

Efficiency, economy, neatness and appreciation of practical operating conditions are reflected in the furnace room shown in Fig. 5. As nearly as possible the room is fire proof with ample light entering through high windows. Gas and smoke are exhausted through a fan in the wall near one end. A long narrow pit in the center of the floor contains the battery of melting furnaces made by the Fisher Furnace Co., Chicago and designed to use a No. 70 crucible with an approximate holding capacity of 200 pounds of brass or bronze. Natural gas is employed as fuel for melting the metal. The comparatively simple piping equipment for regulating amount of air and gas as shown in Fig. 5 is mounted close to the south wall. Small gages on each unit enable the melter to maintain practically ideal melting conditions in the furnaces with a neutral flame.

Red brass for valves, fittings and other castings of a somewhat similar character conforms approximately to the well known formula 85 three 5's that is copper 85 per cent, tin 5 per cent, zinc 5 per cent and lead 5 per cent. A second mixture for faucets, shut-off valves, etc., contains copper 79 per cent, tin 2 per cent, lead 7 per cent and zinc 12 per cent. Ordinary yellow brass, perfectly satisfactory for a wide miscellany of castings contains copper 65 per cent, tin 1 per cent, lead 2 per cent and zinc 32 per cent.

Fig. 6—Small cores are made on the bench and dried in drawer type gas fired ovens equipped with control devices for temperature and circulation of air

MALLEABLE GROUP HOLDS Annual Meeting

ANNUAL meeting of the Malleable Founders' society at White Sulphur Springs, W. Va., June 27 and 28, featured reports of the various activities of that organization and the discussion of plans for future work. Membership in the society was well represented at the meeting.

Announcement was made that the board of directors recently elected John A. Wagner, president, Wagner Malleable Iron Co., Decatur, Ill., as president of the society succeeding Frank O. Parker, sales manager, Acme Steel & Malleable Iron Works, Buffalo. R. R. Fauntleroy, president, Moline Malleable Iron Co., St. Charles, Ill., was named vice president and Robert E. Belt, Cleveland, was re-elected secretary-treasurer. Announcement also was made that at recent sectional meetings, the following society directors were elected for the ensuing year:

Western Section:—C. L. Carter, Albion Malleable Iron Co., Albion, Mich.; C. A. Gutenkunst Jr., Milwaukee Malleable & Gray Iron Works, Milwaukee; R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill.; John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill.

Central Section:—Anthony Haswell, Dayton Malleable Iron Co., Dayton, O.; A. F. Jackson, Michigan Malleable Iron Co., Detroit; H. A. Marti, Maumee Malleable Iron Co., Toledo, O.; C. H. McCrea, National Malleable & Steel Casting Co., Cleveland.

Eastern Section:—H. Nelson Albright, Columbia Malleable Castings Corp., Columbia, Pa.; L. A. Dibble, Eastern Malleable Iron Co., Naugatuck, Conn.; Frank O. Parker, Acme Steel & Malleable Iron Works, Buffalo; F. C. Tuttle Jr., Belcher Malleable Iron Co., Easton, Mass.

An interesting discussion of the work of the various committees and staff members of the society was presented by R. N. Cole, Canton Malleable Iron Co., Canton, O. The speaker dealt in some detail on the numerous reports which have been prepared by these committees and staff members covering the many problems relating both to management and production. Enrique Touceda, consulting engineer, Malleable Founders' society, presented a paper, "An Unusual Structure in Malleable Iron," which related to the rare occurrence of the so-called inverse chill in malleable iron. Prof. Touceda indicated his belief that in malleable, an inverse chill results from a bled casting.

Leon J. Wise, Chicago Malleable Iron Co., Chicago, presented the report of the committee on research

and product improvement, outlining the projects which were completed during the past year and indicating the direction which the activities of that committee will take during the coming year. C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis., reported on the work of the publicity and market development committee.

General report of the work of the technical council was presented by Carl F. Lauenstein, Link-Belt Co., Indianapolis, and reports on two specific research projects were discussed by two committee members. George B. Stantial, Illinois Malleable Iron Co., Chicago, presented an interesting and informative report of a study on the effect of speed in the testing of malleable iron. D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., presented a progress report on a study of physical properties at limit of strength.

Concluding the technical program, James H. Lansing, shop practice engineer of the society, reported on a melting refractory study. Charts showing the comparative effect of various operating factors were presented and interpreted. Among other items the field of the brick bottom was indicated to be in large air furnace or duplex operation.

Foundry Burns New Necks on Rolls

The accompanying illustration shows a cast iron roll repaired by the so-called burning-on process. In service the broken neck lying in the left foreground broke away from the main body of the roll. A new neck was attached to the body by pouring molten iron over the exposed broken surface until fusion or welding took place. During the past year approximately 80 rolls have been repaired in this manner by the Fulton Foundry & Machine Co., Cleveland. The roll shown is 24 inch diameter, 36 inch face, but the process has been applied to 60 and 84-inch mill rolls, various types of refiner rolls, mixing, crushing, washer and tin mill rolls, plasticator screws, hard rubber grinding rolls and warming mill rolls.

From 2 to 5 tons of iron are required. Meehanite metal, a dense homogenous metal when cast either in thin or thick sections is employed in the process. This metal is poured at a very high temperature to promote perfect fusion with the existing broken surface of the roll shoulder in a minimum period.

Long rolls are set up in a pit, while shorter rolls may be set up on the floor and surrounded by a suitable flask part or parts. In either case the sand is rammed around the roll as high as the broken part. A flask is set in place with the upper edge flush with the top of the casting and a parting is made in the usual manner. Alternatively the flask might be omitted and the next part of the mold, corresponding to a cheek or cope, might be guided into place with stakes driven into the floor. However, the flask part is more convenient and parts always are available.

New neck burned on roll to replace broken neck shown in left foreground

A wood pattern the shape and size of the new neck is adjusted centrally and vertically on the casting. The flask is set in place with a gate stick extending through a hole in the side and touching the pattern about an inch above the casting. The flask is rammed full of sand in the usual manner, lifted off, blacked and dried in the oven. Then it is replaced on the casting. Exceedingly hot iron is poured into the mold. The ladle is kept moving so that the stream of iron strikes all parts of the exposed surface. Surplus iron flows through the opening at the side near the bottom and into a pig bed prepared for the purpose. After the iron has been flowing for some time an experienced man feels the surface of the casting with the end of a light steel rod. At first the surface is hard and unyielding. Gradually this condition changes and the metal under the end of the rod becomes soft and mushy. When the operator has satisfied himself that the entire surface, especially the outer edge is in this condition, the hole is plugged and the remainder of the mold is filled with molten metal. The top is covered with an insulating powder and no further feeding is required. Approximately ¾-inch metal is allowed on the outside of the new neck for finishing. Time and temperature factors eliminate any tendency to chill.

Electro Metallurgical Co., a unit of Union Carbide & Carbon Corp., New York, recently has inaugurated the manufacture of ferroalloys at a new plant at Sheffield, Ala.

Book Review

Pattern Making, by John McC. Wilson, cloth, 140 pages 4¾ x 7¼ inches, published by Chemical Publishing Co. Inc., New York. $1.50.

This book is one of a series, uniform in size, binding and general appearance, and approximately uniform in volume of text dealing with specific phases of the metal working industry in Great Britain. The present volume is copiously illustrated with 100 free hand and mechanical drawings and carries a two page index. General scope of the work is indicated in the following chapter headings: Wood for patterns; curvatures and shrinkage; tools, contraction and contraction rule; pattern drawing; wood turning; solid, hollow and face turning; plain gearing; spur and pinion wheels; cycloidal and involute teeth; building wheel; wheels, rims, ribs, arms, bosses; temporary pattern and mold; chilled castings; chilling with iron borings and sand; ornamental column with plaster of paris pattern; plaster patterns for molding; camber; carved capital; spiral shaft; cylindrical work; construction of barrels; molding cylinder in loam; obtaining uniform metal thickness, swept up work in sand; glue and gluing.

Policyholders Service bureau of the Metropolitan Life Insurance Co. recently has published an interesting bulletin entitled, "The Annual Report to Employes." The publication shows the varied and ingenious ways that financial statements are being presented and interpreted to employes so that they may be understandable to those not versed in accounting terms. The study describes and illustrates different methods of presentation employed, media through which reports are transmitted, subject matter, physical makeup and related topics. Copies may be received from the company at 1 Madison avenue, New York.

A.S.T.M. CONSIDERS STANDARDS

(*Continued from page 32*)

meeting high in 1939 and 1934, and was second only to the New York city attendance in 1937, of 1523. It was announced that the 1941 meeting of the society would be held in Chicago, June 23-27 at the Palmer House. At that time the society will stage its sixth exhibit of testing apparatus and related equipment.

During the meeting W. M. Barr, chief chemical and metallurgical engineer, Union Pacific Railroad Co., Omaha, Nebr., succeeded H. H. Morgan as president; H. J. Ball, professor of textile engineering, Lowell Textile institute, Lowell, Mass., was chosen vice president to serve with G. E. F. Lundell, chief, chemistry division, National Bureau of Standards, Washington, who was elected vice president in 1939. The following members were elected to the executive committee for a term of two years: Roger C. Griffin, treasurer, Arthur D. Little, Inc., Cambridge, Mass.; Paul D. Merica, vice president and director, International Nickel Co., New York; Jerome Strauss, vice president, Vanadium Corp. of America, New York; Stanton Walker, director, engineering and research division, National Sand and Gravel association, Washington; and C. H. Fellows, head, chemical division, research department, Detroit Edison Co., Detroit.

Of the six items pertaining to cast and malleable iron presented at the session on Wednesday evening, two were committee reports, one covering the activities of committee A-3 on cast iron which included the recommendation to adopt the tentative specifications for automotive gray iron castings (A 159-35 T) and lightweight and thin sectioned gray iron castings (A 190-36 T).

The committee on malleable iron castings reported a continuation of its work on welding of malleable iron. The committee also was responsible for a technical paper dealing with "Properties of Commercial Pearlitic Malleable Irons" by C. H. Lorig, Battelle Memorial institute, Columbus, O. Various data submitted by producers were reported in the form of an extensive table and curves. They show close relationship between tensile strength and brinell hardness and between yield point and brinell hardness. The author pointed out that in a broad sense, these relationships are independent of the method of preparing the pearlitic malleable irons and are not affected greatly by the character of the combined carbon particles.

Ductility Affected by Microstructure

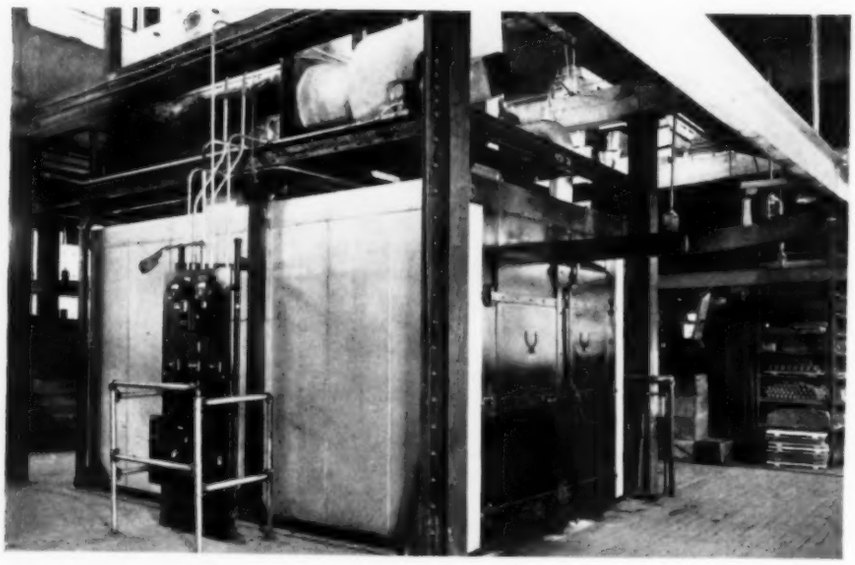
Also included were figures on the effect on tensile properties of various chemical constituents including combined carbon, manganese, and alloying elements such as molybdenum and chromium. Evidence indicated that the ductility of pearlitic malleable irons is affected by the microstructure more so than is tensile strength and yield point. As a result of the study the committee plans to consider inserting more specific requirements for physical properties in the tentative specifications for pearlitic malleable iron castings, (A 220-39 T).

Continuation of studies on torsional properties of gray cast iron were described in a paper by Jasper O. Draffin, W. Leighton Collins and Carl H. Casberg, University of Illinois, Urbana, Ill., which included the use of larger sizes of material than incorporated in previous tests. Cylinders having outside diameters of 3½ and 4½ inches with wall thickness ranging from 0.10 to 0.70 inch were used. Results obtained corroborate those found previously

Another Highly Efficient

CARL-MAYER CORE OVEN

in foundry of
WHITEN MACHINE WORKS
Whitinsville, Mass.



Carl-Mayer Double End Rack Type Core Oven with Oil Fired Air Heater and Overhead Rack System.

Typical CARL-MAYER CUSTOMERS ...

Aluminum Co. of America
American Radiator Co.
Bucyrus-Erie Co.
Cadillac Motor Co.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Motors Corp.
Gilbert & Barker Co.
Harrison Radiator Corp.
Packard Motor Co.
Studebaker Corp.
Whiting Corp.
Whiten Machine Works.

ANOTHER INSTALLATION
featuring

1. Savings 25 to 50% over previous equipment.
2. Uniformity of baking only achievable with a recirculating air heater system such as designed and built by Carl-Mayer.
3. Overhead means of conveyance assuring minimum core breakage and handling convenience.
4. Ventilation designed to eliminate smoke and gas nuisance.
5. Ruggedness typical of Carl-Mayer design.
6. Appearance, beautiful and trim, elevating the core room of a foundry above ordinary levels.

CORE AND MOLD OVENS—ALL TYPES

Over 20 Years' Experience

The CARL-MAYER Corp.
3030 Euclid Ave., CLEVELAND, OHIO.

in small solid and hollow cylinders. The modulus of rupture ranges, in a fairly regular curve, from 1.35 times the tensile strength for a solid cylinder to a value of 0.75 times the tensile strength for a hollow cylinder having a ratio of wall thickness to outside radius of 0.057. The curve, if extrapolated to zero (t/r), gives a value for the modulus of rupture equal to 63 per cent of the tensile strength. Ratio of the maximum tensile deformation developed in torsion to the maximum tensile deformation developed in tension (strain ratio) decreases as the ratio of wall thickness to outside radius decreases until a (t/r) value of about 0.2 is reached after which there is no further definite change.

Prof. R. D. Landon, Southern Methodist university, Dallas, Tex., reported on the physical properties of malleable cast iron to obtain additional data on *yield point* stress. According to Prof. Landon, the results from some 141 tension specimens of malleable cast iron indicate that yield point stress might better be expressed as a percentage of the ultimate stress rather than as an arbitrarily fixed value. An elongation in 2 inches of 0.02-inch is recommended for the divider method of measuring deformation at yield point and a stress of 63 per cent of ultimate for minimum yield point stress is suggested. If an elongation in 2 inches of 0.01-inch is to be used, the suggested minimum yield point stress is 60 per cent of ultimate and a more accurate means of measurement should be employed. To be consistent with the society's definition of yield point, a new term *proof stress* was suggested for the stress to be equalled or exceeded at a definite, measured elongation. Confirmation of negligible reduction in the strength of machined castings is mentioned.

Discuss Radiographic Testing

An exceptionally interesting technical session, held Monday evening preceding the formal opening of the annual meeting, featured a discussion of radiographic testing of airplane components. The meeting was held under the direction of committee E-7 on radiographic testing. In introducing the subject, Dr. H. H. Lester, Watertown Arsenal, Watertown, Mass., and chairman of that committee, stated that all governments have specified radiographic inspection of airplane parts. Without specifications, such inspection cannot be uniform. Therefore, both manufacturers and users are greatly concerned with the problem.

In a discussion on, "Quality and Quantity X-Ray Examination of Aircraft Materials," T. A. Triplett, Triplett & Barton, New York, stressed the rapid changes taking place in methods of test. He pointed to the great difficulty in keeping track of tests, especially when it is considered that one organization is testing as high as 17,000 individual parts per day radiographically. It is necessary first to determine the technique for testing each part, and then make that technique standard in production testing of the part. The speaker also stressed the need for better dark room practice and proper ventilation of the dark room.

Kent Van Horn, Aluminum Co. of America, Cleveland, discussed, "Radiography of Aluminum Castings and Forgings for Airplanes." The speaker stated that his organization employed radiographic inspection for the following reasons: 1. To make sure that castings are used in all places where they are most serviceable, and 2. To care for a responsibility to the customer. Mr. Van Horn pointed out that in the case of sand castings, shrinkage cavities will be encountered unless progressive solidification is provided. The designing engineer provides a factor of safety for such a situation, and frequently, in the opinion of the speaker, the factor of safety included in design is too ample.

Another HANDLING PROBLEM Solved...for Malleable Foundry

THIS Chicago Tramrail installation in the malleable foundry of the Wm. E. Pratt Mfg. Co., Joliet, Ill. was designed to off-set the hoist itself from the excessive heat directly over the furnace. Operating controls are located at one end. Our experience has included the design of handling equipment for every department of the malleable foundry.

We are fully equipped to design, fabricate and install special cranes or overhead equipment, hand or electric, to meet the individual requirements of malleable, gray iron and nonferrous foundries.

This includes not only the conventional overhead hand or electric crane, but also underhung and transfer cranes, wall bracket jib cranes, gantry cranes, etc. in capacities from $\frac{1}{4}$ to 10 tons. May we study *your* problem, quote on your next order?

CHICAGO TRAMRAIL CO.

CRANES • HOISTS • MONORAILS

Specializing in Service to Foundries Throughout the Middle West

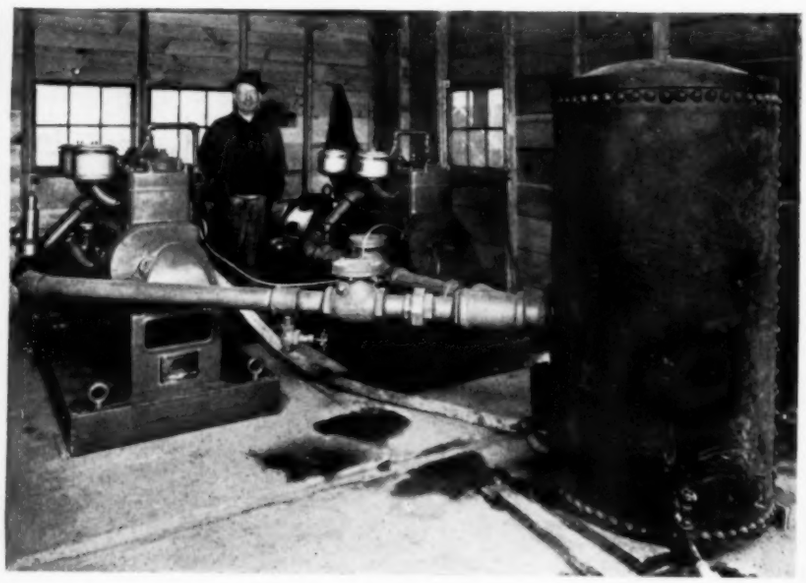
2910 CARROLL AVE. CHICAGO, ILL.

Three of the four foundries operated by his company have X-ray equipment, and the primary function of these units is to develop procedure and, to a small extent, to do routine inspection of castings. Mr. Van Horn stated that because there are things which the X-ray will not show, considerable judgment is necessary in interpreting radiographs. At the same time other tools are necessary to carry on other tests in conjunction with radiographic inspection. These include chemical analysis, spectrographic analysis, microscopic inspection, control of foundry variables such as melting and pouring temperatures, use of individually cast test bars, heat treating test bars simultaneously with the castings, etc.

The speaker stressed the value of the load marked blueprint as a means of acquainting the manufacturer of castings with the engineering application of the cast part. In his opinion, the practice of indicating operating stresses on the blueprint has been a factor in increasing materially the use of aluminum castings in present day aircraft. It also has been of great assistance in interpreting x-ray films of castings. In closing, Mr. Van Horn expressed the opinion that in the future, aluminum castings will be used in much higher stress applications.

In the final paper, "Technique and Organization in the Radiography of Air Craft Castings," L. W. Ball, Canadian National Research Laboratories, discussed the details of procedure as established by his organization.

SCHRAMM
AIR COMPRESSORS



● Battery of SCHRAMM "Utility" Direct Motor Drive Compressors. On the left a 600 cu. ft. compressor with 100 H.P. motor. On the right a 450 cu. ft. compressor with 75 H.P. motor. Note the small size, compare with the man in charge, total floor space, exclusive of air tank, 7½ ft. x 9 ft.

Automatic Pressure Control
Pressure Lubrication On All Bearings
Clean—Accessible—Efficient—Economical

Bulletin 3907 describes these and all other sizes of SCHRAMM "Utility" Stationary Compressors. Get your copy

SCHRAMM, INC.

800 N. GARFIELD AVE. ESTABLISHED 1900 WEST CHESTER, PA.

British Conference Is Cancelled

Due to the gravity of the war situation, and because many of the foundries are operating 7 days a week, the executive committee of the Institute of British Foundrymen cancelled the foundry conference which was to have been held in Cheltenham on June 7 and 8. Copies of papers will be circulated to all who intended to participate, and to other members who apply for them. Written discussion of papers is invited, and contributions should be sent to J. Bolton, assistant secretary, St. John street Chambers, Deansgate, Manchester, England.

Book Review

Die-Castings, by Arthur Street, cloth, 160 pages, 4¾ x 7¼ inches, distributed by the Chemical Publishing Co. Inc., New York, for $1.75.

This volume essentially is directed to the users of die castings who are concerned with the design, purchase or application. It is divided into 26 chapters of which the first four relate to a definition of the die casting, the gravity die casting, the pressure die casting, and choice of the alloy. The next four chapters give information on zinc-base, aluminum-base, brass and aluminum bronze die castings. Designing for die casting is discussed in chapter IX while chapters X and XI are concerned with cored holes and undercuts. Chapters XII, XIII, XIV, XV and XVI relate to factors relating to die opening, inserts, choice of section, die casting of threads and gears, and lettering and decoration. Methods of assembling die castings are described in chapter XVII while die life is discussed in chapter XVIII. Cost of die castings and machining are discussed in chapters XIX and XX. The remaining chapters are concerned with plating of zinc-base die castings, combination of plastics with die castings, inorganic and organic finishes for zinc-alloy die castings, finishing of aluminum alloy die castings, inspection, and a discussion on, "Should a User Make His Own Pressure Die Castings?" The book concludes with a bibliography which occupies nine pages.

GLASS MOLDS PRESENT PROBLEMS

(*Continued from page* 31)

from ounces to pounds and of decidedly varying chemical composition, suddenly heats the mold surface or skin to a temperature approaching 1800 degrees Fahr. with a temperature gradient to the outer surface of a few hundred degrees.

Molds for steel ingots are not analagous to those for glass. One reason for an adequate knowledge of mold use lies in the fact that they arrive at the pouring station in varying degrees of temperature and of surface condition. The mold may have been cooled by air blast, water or oil spray. It may have received no artificial cooling; or it may have been held at a comparatively high temperature by the application of external heat. In some cases it may have been covered with some type of mold coating solution. Under such radically differing techniques is it logical to assume that an analysis suitable for one set of conditions will be equally satisfactory under another?

Exposed to Severe Conditions

Little more than casual perusal of these service conditions brings out certain fundamental requirements for the mold material. The iron should be resistant to deterioration at elevated temperatures. Resistance to corrosive effects from either glass or mold coatings is indicated, along with resistance to wear, and high thermal conductivity or heat dissipating qualities. Service conditions promote growth since temperature and repeated heating and cooling proceed from the surface inward. The pressing station also offers information of considerable value. A plunger is inserted into the gob of chilled glass forcing it into the shape of the mold to reproduce on the surface of the glass the more or less intricate design cut in the mold face.

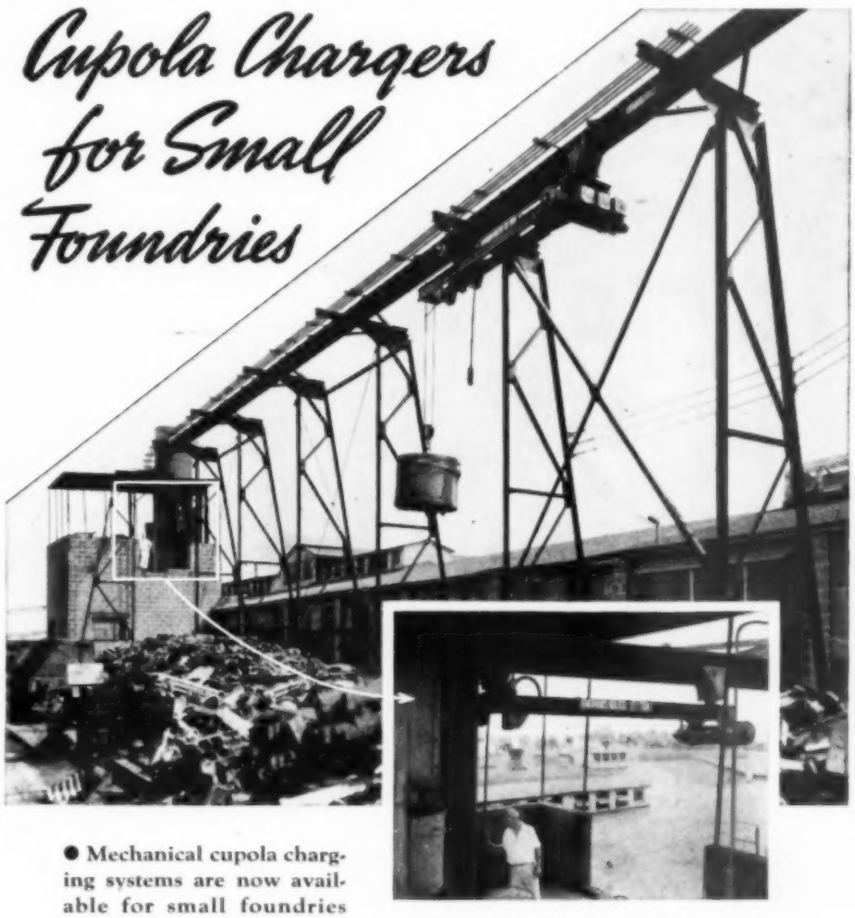
The plunger is of considerable importance in glassmaking. The chilled glass has a wearing or abrasive effect on the plunger in greater degree than on the surface of the mold. Consequently plunger irons probably should be made of a different material than the mold to ensure a longer production life. This effect varies to a considerable degree as to glass, and manufacturing methods. To a considerable extent neck rings fall in the same classification as plungers. Rings always have been a source of trouble and have been made of high speed steels in an effort to surmount the difficulties. However, they may be made of suitable grades of cast iron.

Resistance to wear, highly necessary in plungers and rings also is desirable in the mold. The impact or pressure rarely is very high, but on account of the nature of the mold the rough surface, the effect of opening and closing particularly in split molds, somewhat loose fits at valve or bottom and mold body conjunction points, high notch strength is indicated as a favorable characteristic.

At the takeout station the ware is removed and with other factors equal, the mold proves itself in success or failure. Glassware is a commercial product and is made to rather close tolerances in shape, size, appearance, and capacity. From a standpoint of quality the mold must be resistant to distortion, show low thermal expansion and be able to take and retain a fine polish at high temperatures. From a production viewpoint of course it must have these same characteristics but also it must be of a nature to facilitate production operations, be resistant to heat checking and sticking, and staining or fogging of the ware.

A second important factor to consider from the viewpoint of the mold maker, is the iron required. Conceivably the perfect mold ma-

Cupola Chargers for Small Foundries



● Mechanical cupola charging systems are now available for small foundries with daily melts of 15 to 30 tons.

No need for an expensive cupola enclosure or charging floor. An inexpensive runway to carry the charger and an operator's platform at the cupola door is all the construction necessary.

Foundrymen who seek better metal at lower costs—no matter what the daily tonnage may be—can obtain complete information by writing to Montour Falls.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES CRANE & HOIST CORP.

360 SCHUYLER AVENUE . . . MONTOUR FALLS, N. Y.

terial might be made by the foundryman but if the mold maker is unable to process and finish it at a reasonable cost it would be worthless for all practical purposes. Responsibility of reproducing the designer's ideal in metal is the mold maker's. Only insofar as he is able to do so, will the mold be acceptable. The principal characteristic of interest to the mold maker is the intrinsic ability of the metal to be machined and to take a high finish.

There is no common denominator for machinability. It has been measured in terms of tool life, power costs, metal removed. It has been studied in relation to brinell hardness, to brinell and the reduction of area, and other factors. Hans Ernst in *Physics of Metal Cutting* observes that the principal difficulty is the attempt to use one word to cover three distinct material properties; machinability, finishability, and abrasiveness.

It is not necessary here to discuss machinability. The present day mold shop equipped with modern machines, lathes, milling machines, duplicators, shapers and shape lathes combined with modern small tools tipped with cemented carbides, have seen the machinability index by any reckoning raised to new highs. It is certain that a thorough understanding of the physics of metal cutting can solve many machinery problems or facilitate the usual methods. Each shop in its own interest should maintain a machinability index to serve as a check on production as well as a check

As a rule molds are not even surfaced but on the contrary usually are deep cut with more or less intricate designs which must be done by machine and hand labor. An iron which substantially raises labor and machine costs, however meritorious in its own right, would be ill-advised unless there could be shown definite savings in overall costs which, frankly, is a very difficult item to prove. It is difficult to get adequate comparative production data in same cases. In many other instances the production run may not be of such length as to demonstrate any saving or the necessity of a superlative iron.

Finishing and polishing, ordinarily done in the mold shop, is the final step, weight displacement and size checking excepted, in preparing the mold for delivery to the glassmaker. Even in otherwise well organized mold departments it is too often true that hard spots polished into relief cause the rejection of an otherwise satisfactory mold.

Take High Finish

From the viewpoint of the mold maker, the iron should be machined readily with a structure susceptible to taking a high finish and with a uniformity from set to set conducive to the establishment and maintenance of profitable production schedules. Obviously conditions vary, between jobbing and production shops but either can work out adequate standards.

A third factor of some importance is the economic factors with which also may be combined a psychological factor related to the willingness and determination of management and personnel to expend the necessary energy and to use the required foresight to produce a quality product. These questions may be answered best by a survey of the production facilities available.

Iron analyses have been in the past and probably still are, deliberately manipulated in balance and out of balance in the effort to produce a suitable iron. Unfortunately in many instances alloys have been used with an astounding lack of knowledge or regard for the complexities arising from their use in production. The mere act of alloying a base iron with large or small doses of rare or common elements is no guarantee that the result will

RESULTS are GUARANTEED!
you take no chances in Baking Cores with
MAEHLER
CORE OVENS and HEATERS
Here is why—

- All types of cores, large and small, thin and heavy section, can be baked at the same time—perfectly.
- Baking time reduced from 40% to 60%. More loads handled per day at much less cost per bake.
- Recirculated heat means absolutely even baking of all cores—no guesswork—no mistakes. Stack losses are low. Efficiencies are high. Hence we have shown again and again that we can burn the better fuels, with less overall baking cost.
- Oven temperatures are under automatic control at all times, maintained within 10°F. Once started the oven tends itself—it's foolproof—no fear of under heat or over heat.

50th ANNIVERSARY 1890 1940 MAEHLER

MAEHLER ovens, Core Oven Heating Systems and Heaters are used by leaders in industry *because they deliver positive results!*

A Maehler Engineer will help you select proper equipment for your problem—or show you how your present ovens can be improved with a Maehler Air-Heat System. Write for details today.

THE PAUL MAEHLER COMPANY, 2200 W. Lake St., Chicago, Ill.

be any better than that of the base to which it was added. Alloys presumably are used to produce better physical properties and to attain desired special characteristics. Only within recent years have they really begun to be understood. "The real significance of the contribution of alloys to the structure and properties of cast iron through their ability to control the decomposition of austenite is just beginning to be recognized." *Alloy Cast Iron*, page 7.

If a plain gray iron will do the job effectively no necessity exists for the use of alloys. If service requirements are such that an alloyed iron is indicated, the alloys should be selected in reference to their probable effect on a given base iron and then the beneficence of the alloy or alloys should be used to the utmost by an understanding of the effects on the phases, reactions and constituents of the iron.

Alloys Effect Changes

Without entering into a survey of the metallurgical principles involved, it will suffice to say in broad terms that the use of alloys may shift the eutectic composition, effect the solidification range, accelerate or retard graphitization varying the size, shape and quality of the graphite; raise or lower critical transformation points; and control the temperature of decomposition of the austenite producing the various structures seen in steel and iron. Reactions in iron closely parallel those in steel. F. H. Allison Jr. "Genesis of Martensite and Pearlite," *Metal Progress*, July, 1939 discusses these transformations from the well known *S* curve of Bain and Davenport.

A well balanced iron, properly melted and processed, will possess in greater or lesser degree the physical properties desirable in a glass mold iron. The use of alloys will then enhance or modify the original properties. They are of interest in their beneficial effect on the closeness of grain or density throughout the body of the casting to enhance thermal conductivity, or heat dissipating qualities, low thermal expansion, resistance to growth and susceptibility of taking of a high finish. They also may be used for their effect on the graphite in the iron, promoting high graphitization conducive to machinability, resistance to heat checking and sticking without deleterious effect on the density of the iron. Properly used, certain alloys or combinations of alloys perform the function of making an otherwise unmachinable iron machinable. In correct concentrations alloys may be used to promote resistance to corrosion and staining induced by reaction with the glass or effects of mold cleaning solutions and coatings. These are the physical properties and special characteristics of particular interest in mold making.

This is the first of two articles dealing with many of the complex problems involved in the production of cast iron molds for glass making. The second and concluding section will appear in an early future issue of THE FOUNDRY.

Annual forum of the Porcelain Enamel institute, 612 North Michigan avenue, Chicago, will be held at the University of Illinois, Urbana, Ill., on Oct. 16 to 18. This will be the fifth meeting of its kind sponsored by the institute.

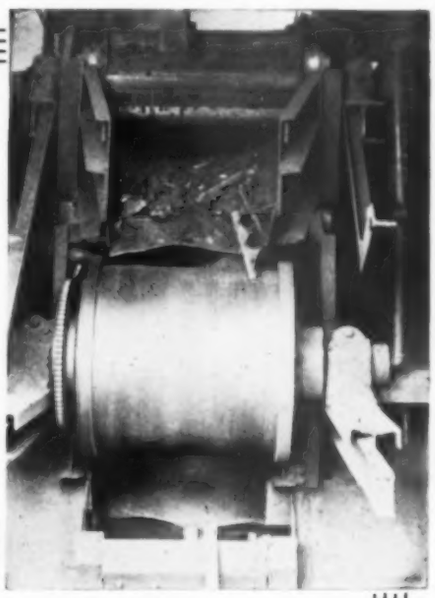
Utilize Coke From Cupola Drop

(*Continued from page 27*)

1 pound coke to 10 pounds iron. In the interest of scientific investigation perhaps we should have experimented farther and increased the spread between coke and iron. Natural caution, accented and intensified through many years of foundry experience, suggested the advisability of leaving well enough alone.

For the benefit of visitors watching operations, the iron came out

A Difficult SAND RECLAIMING Job Licked by Stearns MAGNETIC



HOW to eliminate the scrap metal from hot sand coming off of a steel conveyor was a problem in the foundry division of a prominent automobile maker. And this sand was hot! Conveyor belts were out of the question.

STEARNS Magnetic engineers were consulted and made a study of this problem. Out of their many years of experience in solving foundry problems they installed this specially designed and constructed magnetic drum. It's doing a swell job!

Avail yourself of STEARNS Magnetic advice on sand reconditioning problems or other jobs involving the removal of iron. We can give you a positive, automatic, time and labor saving method with STEARNS Magnetic equipment.

We will be glad to mail this folder or other Bulletins on Magnetic Separators. Write for them.

STEARNS MAGNETIC MANUFACTURING CO.
662 S. 28th St., Milwaukee, Wis.

of the cupola at a temperature of 3000 degrees Fahr. For the information of inspectors and foundrymen visitors the iron in the spout was between 2750 and 2825 degrees Fahr. as measured by optical pyrometer. By immersion pyrometer the iron in the receiver ladle showed temperature between 2550 and 2675 degrees Fahr., usually nearer the lower than the higher figure, but not bad at that for any person who really knows temperature readings.

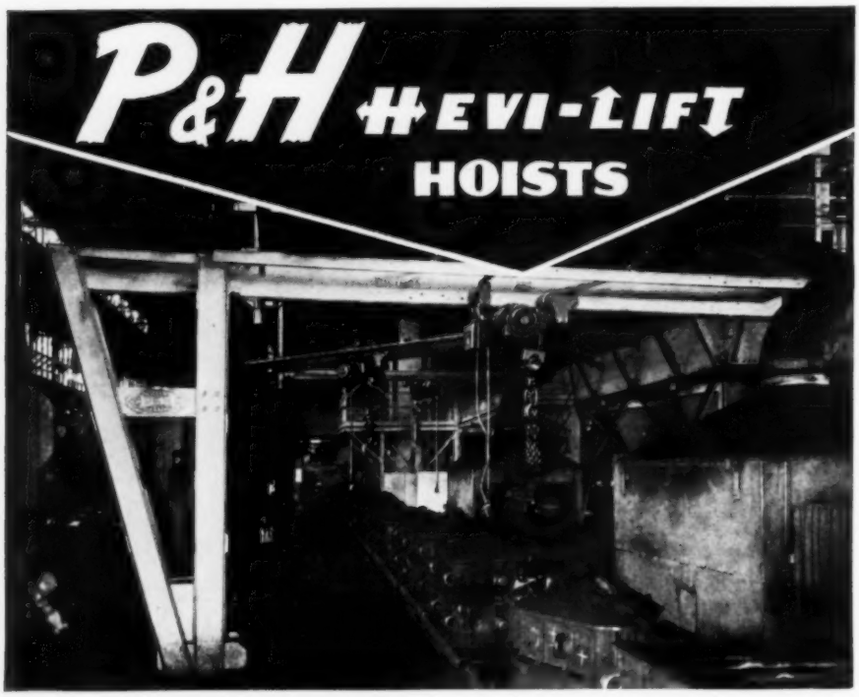
Cupola charges contained steel in varying percentages up to 50 per cent. Since we were interested primarily in making enough money to pay our bills, a close day by day check was not kept on the chemical analysis of the iron. However, a sufficient number of laboratory tests were made to indicate that the sulphur pickup was about 0.005 per cent greater than with the use of all new coke. Other interesting features including total savings are shown in the accompanying table.

Method and equipment for spraying and cooling the coke in the cupola drop are shown in the accompanying illustration. With the combined area of the spray holes equal to two thirds of the cross sectional area of the supply pipe, we anticipated sufficient pressure from the city main to drive the small streams to the center of the coke pile. Cross sectional area of ¾-inch pipe is approximately 0.45 square inch. Area of a 1/16-inch drilled hole is 0.00307-inch, therefore 145 holes would be required to equal the area of the pipe. On the arbitrary 2/3 rule we put in 100 holes. From 10 to 20 minutes application of the spray quenches the coke completely. Under former conditions a stream from a hose would not do the work as satisfactorily in ½ hour. Our next pipe will contain 360 holes 1/32 or 0.00077-inch area.

The pipe is bent to form a ring that will fit inside the cupola legs. A kink permits the pipe to go outside the bottom doors and yet spray over the doors when they hang down. Both ends of the pipe enter a T-coupling connected to the water line. The pipe is held in place with four clamps attached to the cupola legs. With the pipe temporarily in place the surface is chalked and the positions of the three spray rings are marked with a wood gage. The pipe then is removed and the desired position of the holes is marked with a prick punch according to the formula

$$\frac{A}{a} \times \frac{2}{3} = n,$$

where A is the area of the pipe, a is the area of the drill size, n equals the number of holes. The top holes are drilled on a line perpendicular to the chord of the segment. The second row is drilled to spray between legs and center and the bottom row is directed to the outside ring of the drop.



HANDLE IT "THRU-THE-AIR"

Faster, in Spots Like This

Here's another way the speed and ease of "through-the-air" handling can be applied, perhaps in your plant. In this large foundry, heavy molds are handled on and off a conveyor line by means of a self-supporting pillar type jib crane, equipped with a P&H Hevi-Lift Hoist. With handy, push-button control, the P&H Hoist works faster than old-fashioned handling methods; saves time and cuts costs.

The broad experience of P&H hoist engineers is at your command, to solve *your* handling problems in the most practical, economical manner. Ask one to call, or write for your copy of Bulletin H-5.

General Offices:
4405 W. National Avenue Milwaukee, Wis.

HARNISCHFEGER CORPORATION

HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

Pattern Design for Nonferrous Work

(*Continued from page* 33)

lished a standard method of coloring patterns. These standard colors indicate definitely surfaces which must have allowance for machining; for core prints, so as to leave no doubt as to whether a part of the pattern is a boss or a core print, and other details. It cannot be urged too strongly that the standard color scheme should be adopted universally to eliminate confusion and frequently serious expenses.

If the standard color designations are observed carefully by all who make patterns, these tools of the foundryman will be produced with the different parts colored in accordance with this scheme and marked savings in nuisance costs in the foundry will result. Further-

more, in checking castings to be sure that the proper machining allowance has been provided, such a color scheme would insure the checking of all surfaces that are to be machined. Even when blue prints are available, giving the details of the final castings, or final assembly of castings, some surfaces or some dimensions are likely to be overlooked. With the patterns colored to accent definitely those places that must have stock for finish allowed, there can be little or no chance that the foundry in checking the first castings will not check all surfaces.

In producing the first or single pattern of a given part a number of precautions should be observed carefully. It may seem economical to make a very cheap pattern and there are instances when this is perfectly true. However, where there is likelihood of distortion by warpage or where a number of castings are to be made from the cheap pattern, the change of dimensions due to poor lumber may result in rejected castings. Therefore, it is wise to make single patterns of well dried, preferably hard wood, properly laminated from several thicknesses of wood so that warpage is at a minimum and the pattern will continue to be true to design even after producing a number of castings.

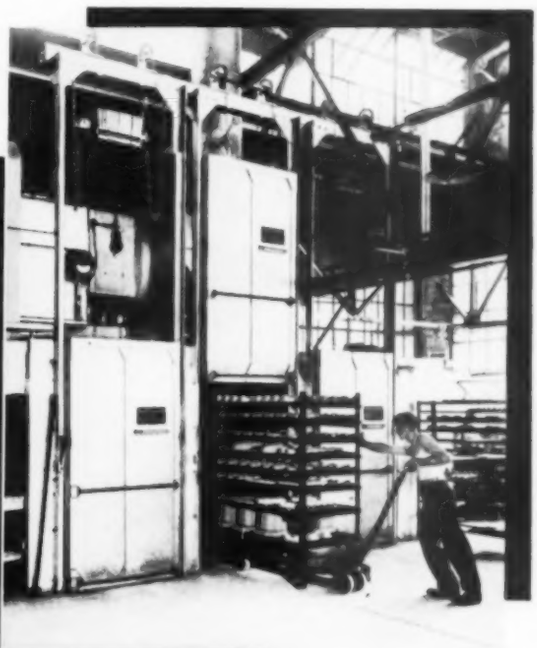
May Cause Trouble

Coreboxes likewise should be built from well dried, good lumber, preferably hard wood. Where it is expected that a number of castings are to be produced, the surface should be sheathed over with metal so that the constant striking off of cores will not wear the surface of the corebox resulting in cores that require an undue amount of patching. Single patterns built up of a number of sections must be reinforced properly to insure against change in dimensions. A skeleton pattern may produce one or two castings satisfactorily, but it will be noted that we use the word *may*. Use of skeleton patterns in the nonferrous foundry is a mistake. Cost of producing nonferrous castings is sufficiently high to make it advisable to save rejections as much as possible. Production of large size castings with skeleton patterns often courts disaster since the casting shaken out may be so far from the design originally intended that it must be rejected, resulting in a very serious loss that would have paid for a proper pattern many times over.

Sweep coreboxes or skeleton coreboxes are sometimes satisfactory; that is, where the design is not intricate and where the accuracy of wall thickness is not going to be a source of rejection. Owing to the high cost of the metals, accuracy of wall thickness is an important factor since excessive wall thickness results in a waste of expensive metals. Consequently, the cores must be accurate as well as patterns. With accurate molding resulting from good pattern and an accurate core from a good corebox, accurate wall thicknesses should result, and with accurate wall thicknesses, a minimum waste of expensive metals is assured. Thus, it will be seen that a well made corebox will often more than pay for itself in the resulting economy through accurate wall thicknesses.

It must be emphasized over and over again that good patterns for the nonferrous foundry must be made so that they can be molded in the proper position to permit attachment of risers at points where they are needed to insure feeding for soundness. Since shrinkages of various nonferrous alloys differ somewhat and more particularly differ materially from those of some ferrous metals, the amount of shrinkage for a given alloy must be taken into account. Consequently,

BATTERY OF COLEMAN TRANSRACK CORE OVENS with Oil Fired Recirculating Heating System — Liberty Foundry Co., Wauwatosa, Wisc.



Experience Says... USE COLEMAN OVENS for lowest cost core baking!

Over thirty-five years of "know-how" and the experience gained in building 5,000 successful installations is back of every Coleman Core and Mold Oven.

Coleman Ovens are famous for their uniform baking, savings in fuel, binder and labor.

Coleman Transrack Ovens reduce the handling labor, time and core loss in movement of cores from core makers to ovens and from ovens to finishing.

. . .

COLEMAN OVENS

Are built in the following types:

PORTABLE, ROLLING DRAWER, TRANSRACK, TOWER (vertical), CAR, HORIZONTAL CONVEYOR

For use with any fuel which is most economically available — coke, stoker coal, powdered coal, oil (any grade), natural or manufactured gas, propane, butane, electricity.

Write for catalog.

THE FOUNDRY EQUIPMENT CO.
BUILDERS OF COLEMAN AND SWARTWOUT OVENS
CONTRACTING ENGINEERS AND MANUFACTURERS
CLEVELAND, OHIO

COLEMAN
CORE AND MOLD OVENS

patterns designed for use in steel or iron foundries, almost invariably are unsatisfactory for use in the nonferrous foundry, if dimensions are to be held to satisfactory tolerances.

Matchplates are used frequently in the mass production of nonferrous castings. However, due allowance must be made for shrinkage during the casting of the matchplate as well as shrinkage of the castings in the nonferrous alloys made from the matchplate. Consequently, two shrinkages must be provided and a thorough study must be made so that the resulting nonferrous castings will measure up to the desired dimensions in all directions. Frequently in the case of matchplates, shrinkage allowance in one direction is not the same as in another direction, resulting in distortion of measurement that may effect the accuracy of the resulting product of bronze or brass castings produced from these patterns.

Modern mass production demands that castings reach the machine shop with sufficient accuracy to drop into jigs without the necessity for special filing, grinding or any other additional step. Hence, a small error in dimensions at any one point on a casting may be a serious matter. First, because it makes trouble in jigging for machine work, and secondly it adds to the weight of the casting, resulting in an additional cost for high priced metals that was not previously anticipated in cost estimates.

The surface of matchplates should be smooth and clean, which means that they must be cast in relatively fine sand. Matchplates must have the proper gates incorporated thereon which means that experiments should be carried on to determine the ideal position and size of gates, risers, and sprues. Where large quantities of castings are to be made from matchplates, such experiments are definite economies in spite of the opinion that a given casting is so simple that all we have to do is to follow out the principles previously used in the case of another pattern. However, each pattern has inherent peculiarities in spite of anything to the contrary. Thus, a true experiment will be well worthwhile to uncover these peculiarities and make compensation therefor.

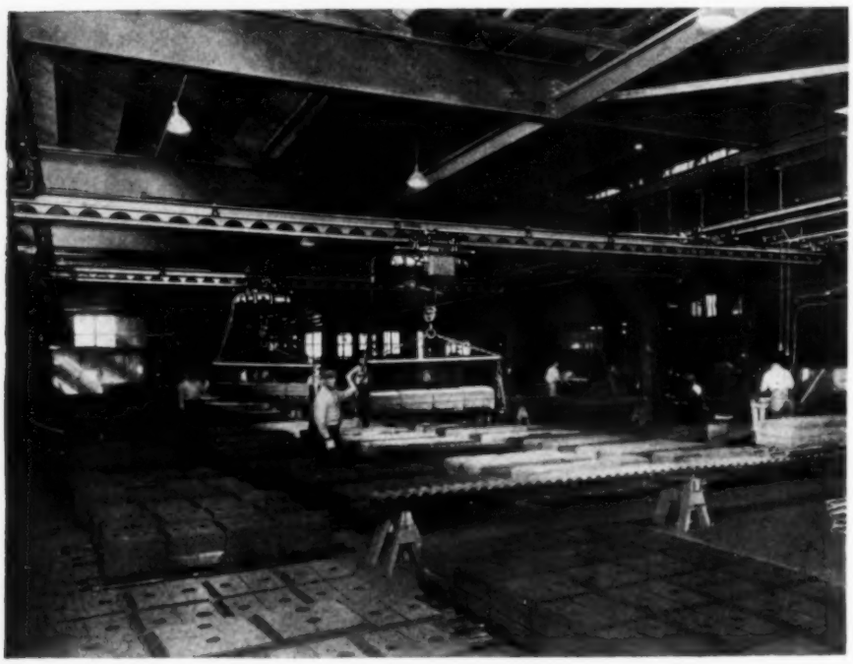
Furthermore, a definite saving in the amount of metal in gates, risers and sprues may result in an increase in the number of molds that a ladle full of metal would pour, or in other ways serve to more than compensate for the expense of the series of experiments. Such experiments also will provide accuracy in the castings themselves, resulting in the assurance that they will invariably fit the jigs and will give a minimum amount of trouble in the subsequent machining operations.

Use Metal Matchplates

Ordinary wood matchplates are not very satisfactory. They warp, crack and shrink and frequently give trouble that is not found in the metal matchplates or in recently developed composition plates of laminated wood and aluminum. If the number of castings warrants the use of matchplates, the job ought to be of sufficient magnitude to warrant metal matchplates. Wood patterns mounted on metal matchplates sometimes will give satisfactory results if the patterns are surfaced with wear resisting metal, either steel or bronze and the points where they receive the greatest wear.

Wood patterns should be given a coat of shellac frequently so that they change their dimensions as little as possible. Loose parts must be dowelled accurately and other precautions taken to insure the maintenance of dowel and dowel holes in good condition to provide accurate location of loose parts.

One tendency on the part of pat



MORE WORK IN LESS TIME with this

INEXPENSIVE MOLD HANDLING SYSTEM

Four molds are handled at one time easily and quickly with this Cleveland Tramrail overhead system. The hard lifting work is done by push-button-operated hoists. The molds are then delivered to any point in the foundry by easily pushed carriers and hand-propelled transfer bridges.

A Cleveland Tramrail System like this is inexpensive to install, pays for itself in a short time, and will provide real dividends on the investment for many years to come.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 Depot Street Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

tern makers who produce patterns for nonferrous foundries needs to be discussed here, since it is frequently the cause for errors and arguments between foundry and casting user. They crowd too many patterns in a flask, or provide a matchplate to be used in too small a flask for the proper accommodation of the patterns. It may seem to be economy to fill the flask very full of castings but where an accurate record of the number of good castings and bad from each plate is not available, it is not easily determined that certain castings in each flask full are bad and must be rejected.

In designing a matchplate for a gate of patterns, provision must be made for the proper flow of the metal to the runner and gates and to the casting cavity so that proper feeding takes place. At the same time the patterns must be located in the flask so that in making the sand mold, proper uniform ramming conditions may be maintained to eliminate distortion of the size of the casting. Also adequate sand should surround the risers or sprues to prevent break-out under pressure of the weight of metal.

From the foregoing it is apparent that practically all details relating to pattern equipment and design best can be anticipated and provided for by a proper conference between designer, patternmaker and competent foundryman before any work is done, either in the production of the patterns, choice of flasks, or the making of the final castings. The designer may find that he can make a material saving in the cost of his finished part by a small and nonessential change in design.

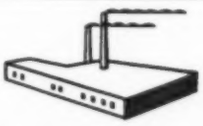
Book Review

History of the Cast Iron Pressure Pipe Industry in the United States of America, by Henry Jeffers Noble, works manager, American Cast Iron Pipe Co., Birmingham, Ala. Published by the Newcomen Society, Birmingham.

In this text of an address delivered at a dinner under the auspices of the Alabama committee, American branch, the Newcomen Society of England, at Birmingham, Ala., April 26, 1940, the author in an interesting, scholarly and authoritative manner traces the history and development of what is now one of the major branches of the cast iron industry, responsible for the production of approximately 12 per cent of the total annual output of gray iron castings.

Early description presents copious extracts from *Early Forges and Furnaces of New Jersey*, by Charles S. Boyer, covering the Weymouth Furnace, Butcher's Forge, Hanover Furnace, Ferrago Forge, Gloucester Furnace, Washington Furnace and Monmouth Furnace, and Batsto or Batsow Furnace. Early pipe foundries grew out of these furnaces including one started by David C. Wood in 1803, an organization still in existence as a pipe manufacturer. Interesting biographical reference is made to a long list of early iron masters and pipe makers including George Peacock who is credited with introducing the pit method of casting pipe in a vertical position in dried molds about 1852.

The industry gradually moved westward through Pittsburgh into Ohio and Kentucky. Reference is made to the development of the pipe industry in Canada, North Central states, Colorado, Pacific coast, Texas, Tennessee, Alabama, Virginia. By 1913 Alabama had forged ahead of all other states with an annual production of more than 1,000,000 tons of pipe and fittings. History of the centrifugal method and the men connected with it is included. The volume concludes with a bibliography and a list of American pipe manufacturers and a list of the members of the Alabama committee of the Newcomen Society.



Leading Jobbing and Production Foundries are installing DETROIT ELECTRIC FURNACES

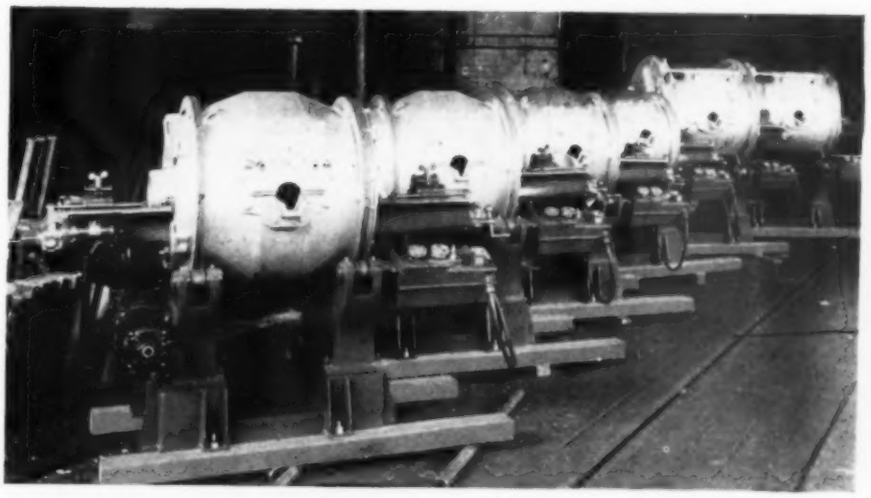
Detroit Electric Furnaces now under construction for immediate delivery include the following:

2—175 KW—500 lb. furnaces for making superior quality brass and bronze valves.
1—100 KW—200 lb. furnace for melting pure nickel in the manufacture of nickel anodes.
1—125 KW—350 lb. furnace for melting brass and bronze alloys in jobbing work.
1—30 KW—50 lb. furnace for melting high speed tool steel and special cutting alloys.
1—175 KW—500 lb. furnace for melting alloy gray irons and white iron for short cycle malleable and special heat treated irons.
1—125 KW—350 lb. furnace for general plant maintenance castings.
1—125 KW—350 lb. furnace for experimental and research work.

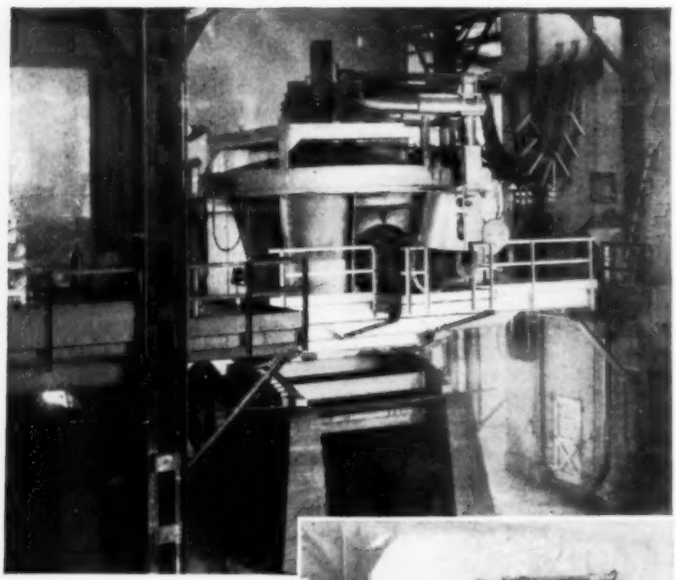
Additional Detroit Electric Furnace installations being made at the present time include furnaces in plumbing goods plants, a valve foundry, arsenal and naval installations and jobbing foundries for producing ferrous and non-ferrous specialty castings of superior quality.

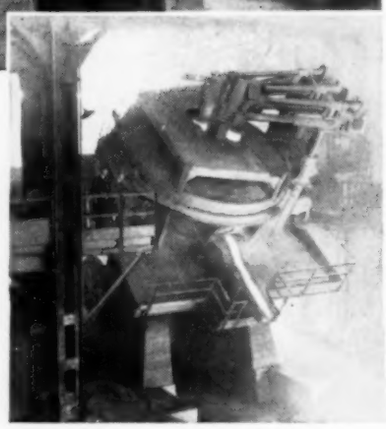
The swing toward Detroit Furnaces is easily understandable. The unexcelled economy, the ruggedness and the speed and versatility of these remarkably efficient machines gives the Detroit-Furnace-Equipped Foundry a decided edge on competition. Write today for bulletin No. 401.

A recent shipment of six Detroit Electric Furnaces—all completely automatic.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN





Illustrated is a recent installation of a 25-ton Heroult Furnace with many special features. It is an all-welded unit equipped with 18-inch electrodes. The platform is attached to the shell — tilts when pouring. The shell is flared from floor level to roof — materially increasing scrap capacity.

Heroult

ELECTRIC FURNACES

AMERICAN BRIDGE Heroult Electric Furnaces now embody novel and distinctive features—the result of constant striving to perfect the most modern and economical tool for efficient melting and refining of iron and steel for castings, high grade alloy, tool and stainless steels.

Dependent on size and operating requirements they are adaptable to hand, chute, machine or drop-bottom bucket charging. Capacity ratings range from ½ to 100 tons.

Why not avail yourself of the specialized experience of our furnace engineers for your specific requirements.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver
Detroit · Duluth · Minneapolis · New York · Philadelphia · St. Louis
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

THESE

BINDERS SERVE ALL FOUNDRY PURPOSES

MOGUL

Experienced Foundrymen from our Technical Service Department are ready to serve you.

KORDEK

Offices and Warehouse Stocks in Principal Cities

CORN PRODUCTS SALES COMPANY

17 BATTERY PLACE • NEW YORK CITY